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PERFORMANCE REPORT

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State Massachusetts Project No. W-35-R-18

Project Title Game Population Trend and Harvest Survey

Project Type Research and Surveys

GOVERNMENT DOCUMENTS COLLECTION MAY 31 1977 University of Massachusetts

Period Covered: 1 June 1975 to 31 May 1976

Work Plan I Statewide Game Harvest

Plan Objectives: To determine the statewide harvest of selected small game and furbearer species and to present recommendations, based upon management practices and regulations, to increase the utilization of certain species.

Job I-1 Statewide Small Game Harvest

Objectives: To determine the statewide harvest of selected small game and furbearer species and to determine the time expenditure by sportsmen,

Summary: A sample of 400 hunters (consisting of two subsamples of 200) was surveyed by telephone to determine their harvest and participation in small game hunting. Additional special questions concerned deer and squirrel hunting and the land use practices at Quabbin Reservation.

Hunter effort was greatest for pheasant, ruffed grouse, cottontail rabbit, woodcock and ducks. Hunter success was greatest for pheasant, cottontail rabbit, ducks, ruffed grouse, and gray squirrel. Estimated harvests were greatest for ducks, cottontail rabbit, raccoon, pheasant and gray squirrel. Sample totals may not accurately represent actual totals. However, useful trend information can be established.

The estimated number of Massachusetts deer hunters was calculated as 66,684 ± 4.7 percent. Shotgun hunters ranked first (97.8%), with archery and primitive firearm hunters both comprising approximately 7.5 percent of the total. The sample estimate of 5,474 successful antlerless permit applicants was not significantly different from the actual total of 5,570.

Most hunters had no opinion regarding the length of the squirrel season. The majority (79%) of those desiring a change wanted an earlier opening date.

Of those respondents indicating a preference, 65.4 percent supported no change in the land use policies at Quabbin Reservation.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Target Date: 31 May 1979

Progress: On schedule

Deviations: None

Recommendations: Continue the small game harvest survey annually for the next three years in order to establish trends in hunter numbers and bag take.

Use the same sample quantities and procedures as in 1976 except that the sample should consist of 400 small game hunters rather than 400 hunters.

Continue liaison with cooperators to refine sampling and analysis of the survey.

Remarks: Procedures. A sample of 400, consisting of two subsamples of 200 each, was used for this telephone survey based upon experiences in previous postcard surveys and recommendations from cooperators.

The sample was drawn from the calendar 1975 license sales of resident hunting and sporting licenses. Each county was represented in the sample by a percentage equal to the percentage of the combined license sales for that county. For example, if Worcester County had 40 percent of the licenses sold, then 40 percent of the sample was from Worcester County. Towns to be sampled in each county were determined by listing each town in alphabetical order and numbering sequentially, commencing with one. Town numbers were then extracted from a book of random numbers separately for each county. Selected pages were read continuously until the requisite number of town selections had been attained. Individual towns could be and were frequently selected more than once. Twice as many numbers as required were drawn to allow for negative contacts.

License stub cards were filed by town in several filing cabinets. There was no sequence to the cards within the town. Individual stubs were selected by drawing a random number and measuring in the requisite number of inches or millimeters (depending upon the thickness of the pile). The first legible resident hunting or sporting license at or after that point was the card selected.

The survey was conducted using a statewide WATS line. Calls were made between 4:30 and 8:30 P.M.

Response data were transferred to IBM cards and totalled by computer by a cooperator at the University of Massachusetts.

Findings: In the first sample (i.e., subsample), 240 sportsmen had to be contacted in order to reach 200 individuals who did hunt. In the second sample, 226 were contacted in order to yield 200 actual hunters.

Responses were initially tabulated separately for each species. The number of hunters seeking and the number of hunters successful by species for the two subsamples and their expanded statewide estimates are presented in Tables 1 and 2.

The subsamples were drawn from license stubs filed by calendar year. However, license sales totals for the year sampled (1975) had not been tabulated on a calendar-year basis. Therefore, the mean combined sales of resident hunting and sporting licenses for the last two years (1970 and 1971) for which calendar year totals were available were used as an approximation of 1975 sales. This mean license sale figure was used in the expansion of the data.

Approximately 16.7 percent (40 of 240) of the hunters in the first sample bought a license but did not hunt. In the second sample, this percentage was approximately 11.5 and in the combined sample was 14.2. For each sample and for the combined sample, the approximate 1975 hunting and sporting license sales (115,946) were reduced by the respective percentage to obtain an estimate of the total number of hunters statewide.

For each subsample, the number of hunters reported seeking each species was expressed as a percentage of the total number of hunters in the sample of 200. This percentage was then multiplied by the estimated total number of hunters as calculated for that sample to obtain an expanded number of hunters seeking each species.

A successful hunter was defined as a hunter who took at least one individual of the species he sought. Hunters seeking more than one species were regarded as successful or unsuccessful separately for each species hunted. The number of successful hunters was then tabulated by species and expressed as a percentage of the total number of hunters seeking in the sample. For each sample, the expanded number of hunters seeking each species was reduced by the respective percentage to yield an expanded number of successful hunters.

There were 167 (83.5%) hunters seeking one or more of 13 small game species in the first sample and 171 (85.5%) hunters in the second sample. When tested by chi-square analysis, these were not significantly different ($x^2 = 0.09$, $t.05 = 3.841$). However, if hunters seeking

Table 1. Number of Hunters Seeking, Number of Successful Hunters, and Mean Take Per Hunter by Species for First Sample of 200 Massachusetts Sportsmen

Species	No. Hunters Seeking in Sample	Percent of Sample	Expanded No. Hunters Seeking*	No. Successful Hunters In Sample	Percent Successful of Sample Seeking	Expanded Number Successful Hunters	Mean Take Per Hunter
Ruffed Grouse	84	42.0	40,565	35	41.7	16,916	1.07
Pheasant	130	65.0	62,779	77	59.2	37,165	1.58
Quail	28	14.0	13,522	18	64.3	8,695	4.36
Woodcock	50	25.0	24,146	23	56.0	13,522	2.54
Canada Goose	25	12.5	12,073	7	26.9	3,248	0.64
Ducks	58	29.0	28,009	42	72.4	20,279	8.71
Opossum	1	0.5	483	1	100.0	483	2.00
Cottontail Rabbit	64	32.0	30,907	46	71.9	22,222	3.44
Snowshoe Hare	16	8.0	7,727	10	62.5	4,829	1.50
Gray Squirrel	34	17.0	16,419	27	79.4	13,037	4.41
Raccoon	14	7.0	6,761	13	92.9	6,281	13.86
Fox	3	1.5	1,449	0	0.0	0	0.0
Bobcat	0	0.0	0	0	0.0	0	0.0
Total	167 (507)			133 (304)			
Other Only	33	16.5					

* 16.7% of hunters sampled did not hunt so expansion was based on 96,583 hunters.

Table 2. Number of Hunters Seeking, Number of Successful Hunters, and Mean Take per Hunter, by Species, for Second Sample of 200 Massachusetts Sportsmen

Species	No. Hunters Seeking in Sample	Percent of Sample	Expanded No. Hunters Seeking*	No. Successful Hunters In Sample	Percent Successful of Samples Seeking	Expanded Number Successful Hunters	Mean Take Per Hunter
Ruffed Grouse	100	50.0	51,306	41	41.0	21,035	1.12
Pheasant	127	63.5	65,159	76	59.8	38,965	1.72
Quail	35	17.5	17,957	19	54.3	9,751	1.91
Woodcock	61	30.5	31,297	30	49.2	15,398	2.15
Canada Goose	31	15.5	15,905	12	40.0	6,362	2.16
Ducks	50	25.0	25,653	39	78.0	20,009	7.70
Opossum	3	0.2	205	2	66.7	137	2.33
Cottontail Rabbit	81	40.5	41,558	58	71.6	29,756	3.53
Snowshoe Hare	28	14.0	14,366	12	42.9	6,163	1.32
Gray Squirrel	42	21.0	21,549	33	78.6	16,938	3.81
Raccoon	19	9.5	9,748	15	78.9	7,691	8.89
Fox	4	0.2	205	2	50.0	102	0.50
Bobcat	4	0.2	205	1	25.0	51	0.25
Total	171 (585)			139 (340)			
Other Only	29	14.5					

* 16.5% of hunters sampled did not hunt so expansion based on 102,612 hunters.

more than one species were treated separately for each species, there were 507 hunters seeking small game in the first sample and 585 in the second sample. This difference is significant (x^2 = 11.20, t.01 = 6.635). There was no significant difference between samples in the number of hunters seeking individual species, except for cottontail rabbit (x^2 = 4.05, t.05 = 3.841) and snowshoe hare (x^2 = 7.07, t.01 = 6.635). No explanation can be advanced as to the reason for the differences on these two species.

There were 138 hunters in the first sample and 139 in the second who were successful in taking at least one unit of small game of any species. This difference is not statistically significant. The percentage of successful hunters taking individual species was significantly different for three of 13 species--Canada goose (x^2 = 5.24, t.05 = 3.841), opossum (x^2 = 13.57, t.01 = 6.635), and snowshoe hare (x^2 = 7.11, t.01 = 6.635). No comparisons could be made for fox and bobcat due to the absence of successful hunters in one sample. The differences for opossum are likely due to the small sample for that species. No reasons can be assigned for the differences in success percentages for the other species.

The reported, mean and expanded bag take for both samples is presented in Table 3. The expanded bag take per species was derived by multiplying the mean take per successful hunter times the expanded number of successful hunters.

There was no significant difference in the total reported take between the first sample (1,655) and the second (1,643), (x^2 = 0.09, t.05 3.841) nor between the mean take per successful small game hunter (9.91 versus 9.61; x^2 = 0.01, t.05 = 3.841). There was also no significant difference in mean take per successful hunter as compared for each individual species.

Expanded hunter numbers and bag take for the combined sample of 400 are presented in Table 4. The expanded take is probably not an accurate representation of the statewide harvest of some species. Furbearer harvest data for the 1975-1976 season shows pelt returns from licensed furbuyers of 5,572 raccoon, 517 fox (red and gray) and 11 bobcat as opposed to an estimated take (from the survey) of 90,292 raccoon, 498 fox and 249 bobcat. Estimated 1975 waterfowl harvests, presented in the U.S. Fish and Wildlife Service's Administrative Reports, are 90,489 ducks and 6,563 Canada geese, as opposed to telephone survey totals of 221,503 ducks and 20,661 geese. Survey figures, however, can provide useful trend data if conducted in a consistent manner from year to year.

Table 3. Reported, Mean, and Expanded Bag Take for Two Samples of 200 Massachusetts Sportsmen

Species	First Sample			Second Sample		
	Reported Take	Mean Take Per Successful Hunter	Expanded Take	Reported Take	Mean Take Per Successful Hunter	Expanded Take
Ruffed Grouse	90	2.57	43,577	112	2.73	54,132
Pheasant	205	2.66	98,625	219	2.88	105,880
Quail	122	6.78	59,088	67	3.53	32,476
Woodcock	127	4.54	61,535	131	4.37	63,487
Canada Goose	16	2.28	7,421	67	5.58	33,491
Ducks	505	12.02	244,330	385	9.87	186.336
Opossum	2	2.00	968	7	3.50	4,518
Cottontail Rabbit	220	4.78	106,474	286	4.93	138,405
Snowshoe Hare	24	2.40	11,618	37	3.08	17,910
Gray Squirrel	150	5.56	72,647	160	4.85	77,503
Raccoon	194	14.9	93,810	169	11.27	81,775
Fox	0	0	0	2	100.00	968
Bobcat	0	0	0	1	100.00	484
	1,655	9.91		1,643	9.61	

Table 4. Basic and Expanded Hunter Numbers and Bag Take for a Sample of 400 Massachusetts Sportsmen

Species	Number Hunters in Sample	Percent of Sample	Expanded Number Hunters Seeking*	Number Successful Hunters in Sample	Percent Successful of Sample Seeking	Expanded Number Successful Hunters	Reported Take (Range)	Mean Take Per Hunter	Mean Take Per Successful Hunter	Expanded Take
Ruffed Grouse	184	46.00	45,783	76	41.30	18,908	202 (1-14)	1.10	2.66	50,295
Pheasant	257	64.25	63,947	153	59.53	38,068	349 (1-12)	1.36	2.28	36,795
Quail	63	15.75	15,676	37	58.73	9,207	189 (1-25)	3.00	5.11	47,048
Woodcock	111	27.75	27,619	58	52.25	14,431	258 (1-24)	2.32	4.45	64,218
Canada Goose	56	14.00	13,934	19	33.93	4,728	83 (1-17)	1.48	4.37	20,661
Ducks	108	27.00	26,873	81	75.00	20,155	890 (1-100)	8.24	10.99	221,503
Opossum	4	1.00	995	3	75.00	746	9 (1-6)	2.25	3.00	2,238
Cottontail Rabbit	145	36.25	36,079	104	71.72	25,876	506 (1-27)	3.49	4.86	125,757
Snowshoe Hare	44	11.00	10,948	22	50.00	5,474	61 (1-12)	1.39	2.77	15,163
Gray Squirrel	76	19.00	18,910	60	78.95	14,929	310 (1-25)	4.08	5.17	77,183
Raccoon	33	8.25	8,211	28	84.85	6,967	363 (1-70)	11.00	12.96	90,292
Fox	7	1.75	1,742	2	28.57	498	2 (1)	0.29	1.00	498
Bobcat	4	1.00	995	1	25.00	249	1 (1)	0.25	1.00	249
	338(1092)			277(644)			3223			
Other Only	62	15.50								

* 14.2% of the hunters sampled did not hunt so expansion based on 99,528 hunters.

The 13 small game animals sampled were ranked by hunter effort, hunter success, and abundance in the bag and then compared with results of the 1970 postcard survey (Table 5). Rankings of the earlier survey did not include opossum.

The top five animals by hunter effort in the 1976 survey (combined sample) were pheasant, ruffed grouse, cottontail rabbit, woodcock and ducks (in decreasing order of effort), with the remaining eight species having less than 9.9 percent of the hunter effort. Rankings were similar in 1970 with the first seven of 12 species equal in preference to those in 1976.

The top six species by hunter success in the 1976 survey were pheasant, cottontail rabbit, ducks, ruffed grouse, gray squirrel and woodcock, with the remaining seven species each having less than 10,000 successful hunters each. Rankings in 1970 were similar, but with ducks-grouse and squirrel-woodcock switching rankings with each other.

The species with the greatest estimated harvest (combined 1976 survey) were ducks, cottontail rabbit, raccoon, pheasant, gray squirrel, woodcock and ruffed grouse. Harvests of the remaining species were less than 50,000 units each. Rankings were largely different in the earlier survey, with cottontail rabbit, ducks, pheasant, woodcock and gray squirrel predominating in the bag. One major discrepancy in these rankings is the abnormally high estimate of raccoon harvest in 1976. Comparisons are closer if this species is disregarded.

One special question asked if the respondent hunted deer in Massachusetts in 1975. There were 131 (65.5%) affirmative answers in the first sample of 200 and 137 (68.5%) in the second. These percentages were multiplyed by the estimated statewide population of hunters for that sample in order to derive an estimated number of deer hunters in the state. The same procedure was followed for the combined sample of 400, which had 268 (67.0%) deer hunters (Table 6).

The estimate from sample one was 63,262 deer hunters; from sample two 70,049, and from the combined sample 66,684. All three estimates were within the range (68,104 $\pm$ 5,380) of a deer hunter estimate derived from an earlier telephone survey of 151 regional deer hunters.

Another question surveyed hunter participation in various types of deer seasons. Respondents were categorized in six seasons and combinations of seasons and expanded for each sample to an estimated number of hunters for each category of season (Table 7). The greatest number of sportsmen hunted the shotgun season only, followed by

Table 5. Ranking of 13 Small Game Animals as to Hunter Effort and Hunter Success for Two Surveys of Massachusetts Sportsmen

Hunter Effort (Number of Hunters Seeking)			Hunter Success (No. Successful Hunters)			Harvest (Expanded Take)		
Rank 1970	Rank 1976	Species	Rank 1970	Rank 1976	Species	Rank 1970	Rank 1976	Species
1	1	Pheasant	1	1	Pheasant	2	1	Ducks
2	2	Ruffed Grouse	2	2	Cottontail Rabbit	1	2	Cottontail Rabbit
3	3	Cottontail Rabbit	4	3	Ducks	9	3	Raccoon
4	4	Woodcock	3	4	Ruffed Grouse	3	4	Pheasant
5	5	Ducks	6	5	Gray Squirrel	5	5	Gray Squirrel
6	6	Gray Squirrel	5	6	Woodcock	4	6	Woodcock
7	7	Quail	8	7	Quail	6	7	Ruffed Grouse
9	8	Canada Goose	10	8	Raccoon	8	8	Quail
8	9	Snowshoe Hare	7	9	Snowshoe Hare	10	9	Canada Goose
11	10	Raccoon	9	10	Canada Goose	7	10	Snowshoe Hare
10	11	Fox	N.S.	11	Opossum	N.S.	11	Opossum
N.S.	12	Opossum	11	12	Fox	11	12	Fox
12	12	Bobcat	12	13	Bobcat	12	13	Bobcat

N.S. = Not sampled.

Table 6. The Estimated Number of Deer Hunters in Massachusetts in 1975 as Derived from Two Surveys of License Holders

Survey No. 1

Sample Size	No. Hunters in Sample	Percent	Estimated No. Hunters	Range (95% C.L.)*
151	93	61.6	68,104	62,724-73,484

Survey No. 2

Sample Size	No. Hunters in Sample	Percent	Estimated No. Hunters	Range (95% C.L.)**
(1) 200	131	65.5	63,262	59,023-67,501
(2) 200	137	68.5	70,049	65,426-74,672
(T) 400	268	67.0	66,684	63,550-69,818

* ± 7.9%
** (1) = ± 6.7%; (2) = ± 6.6%; (T) = ± 4.7%

Table 7. The Estimated Number of Deer Hunters Participating in Archery, Primitive Firearm, and Shotgun Deer Seasons in 1975

	First Sample of 200			Second Sample of 200			Combined Sample (400)		
Season Type	Number Hunters in Sample	Percent	Estimated Number Hunters	Number Hunters in Sample	Percent	Estimated Number Hunters	Number Hunters in Sample	Percent	Estimated Number Hunters
Archery	1	1	633	2	1.5	1,051	3	1.0	667
Primitive	1	1	633	2	1.5	1,051	3	1.0	667
Shotgun	109	83	52,507	120	88.0	61,643	229	85.5	57,015
Shotgun and Archery	13	10	6,326	3	2.0	1,401	16	6.0	4,001
Shotgun and Primitive	6	4	2,530	10	7.0	4,903	16	6.0	4,001
All	1	1	633	0	0.0	0	1	0.5	333
Totals	131	100	63,262	137	100.0	70,049	268	100.0	66,684
All Archery	15	11.4	7,212	5	3.6	2,522	20	7.5	5,001
All Primitive	8	6.1	3,859	12	8.8	6,164	20	7.5	5,001
All Shotgun	129	98.5	62,313	133	97.1	68,018	262	97.8	65,217

equal numbers in the shotgun-archery and shotgun-primitive seasons, equal numbers in the exclusive archery and exclusive primitive seasons, and the least hunters participating in all three seasons. No respondents hunted only in the archery-primitive combination of seasons.

Respondents were then regrouped into three participation categories--archery, primitive, and shotgun hunters--and expanded accordingly for each sample. The combined total yielded an estimate of 65,217 shotgun hunters and 5,001 hunters each in the archery and primitive seasons. The calculated number of archery hunters is significantly different (x^2 = 129.2, t.01 = 6.635) from the 1975 sales of archery stamps (5,872). This can partially be explained by: (1) the sample was drawn from calendar 1975 license sales, but the archery stamp sales were from Fiscal 1975 which included only the calendar 1974 archery season, (2) there is no estimate of how many hunters bought stamps but were later unable to hunt, (3) there is no estimate of how many stamps were bought by collectors.

Respondents indicating that they did hunt deer in Massachusetts in 1975 were further asked whether or not they applied for an antlerless deer permit, and if they did apply, whether or not they were successful. Responses are listed in Table 8. The combined sample estimate of the number of applicants was 39,562 (38,150 - 41,045 in subsamples). This considerably exceeds the actual number of applicants (33,000). No reasons can be assigned for this difference. The expanded number of successful applicants (combined sample), however, was 5,474 which is not significantly different (x^2 = 1.65, t.05 = 3.841) from the actual number of 5,570.

Another special question concerned the dates of the squirrel hunting season. Hunters were asked whether they were satisfied with the present 20 October opening date, and if not, whether it should be earlier or later. Most hunters (224 or 56%) were satisfied, with 135 (33.75%) having no opinion. Thirty-eight (9.5%) desired a different opening date, and 3 (0.75%) did not respond.

The majority (30 or 79%) of those desiring a different opening date preferred an earlier date, while four (10.5%) hunters each preferred a later date or did not respond.

Those hunters who preferred a change were asked if they had read any articles on an earlier opening date for the squirrel season. Thirty (79%) had done so, with 11 (36.7%) reading it in Massachusetts Wildlife magazine, eight (26.5%) reading newspaper articles, five (16.7%) in other sources, one (3.2%) in both magazine and newspaper, and five (16.7%) not disclosing their source.

Table 3. Sampled and Expanded Numbers of Antlerless Deer Permit Applicants and Successful Applicants for a Combined Sample of 400 Massachusetts Deer Hunters

Sample (Amount) (No. Deer Hunters)	Number of Permit Applicants	Percent	Expanded Number of Applicants	Number of Successful Applicants	Percent	Expanded Number of Successful Applicants
Sample 1 (200) (131)	79	39.50	38,150	10	12.6	4,807
Sample 2 (200) (137)	80	40.00	41,045	12	15.0	6,157
Combined (400) (268)	159	39.75	39,562	22	13.8	5,474

A final special question asked all contacts (including non-hunters) to respond to the statement, "The current land-use policies for Quabbin should remain unchanged." with one of five opinions. Most (215, 46.1%) were uncertain, with 147 (31.6%) agreeing, 57 (12.2%) disagreeing, and 27 (5.8%) and 20 (4.3%) expressing strong agreement and disagreement. Nearly two-thirds (65.4%) of those expressing an opinion desired no change in the land-use policies for the Quabbin Reservation.

Acknowledgments: I extend my appreciation to Mr. Joseph Mawson of the Department of Forestry and Wildlife Management of the University of Massachusetts for his continuing cooperation in devising and analyzing the survey.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by _____
James E. Cardoza, Game Biologist

Date _____

W-39-R-12

PERFORMANCE REPORT

U OF MASSACHUSETTS GOVERNMENT DOCUMENTS COLLECTION MAY 31 1977 Univ. of Mass.

State: Massachusetts Project Number: W-39-R-18

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Survey

Period Covered: 1 June 1975 to 31 May 1976

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Work Plan 1 Statewide Game Harvest

Objectives: To determine the statewide harvest of selected small game and furbearer species and to present recommendations, based upon management practices and regulations, to increase the utilization of certain species.

Job 1-2 Statewide Beaver Harvest

Job Objective: To determine the statewide harvest of beavers by trappers.

Summary: A total of 1,135 beaver was taken by 107 trappers in 103 towns during the 1975-76 beaver season. This take is significantly less than both the 1974-75 take and a ten-year (1966-1975) mean take. Harvest trends from 1967-71 to 1972-76, however, have significantly increased in all counties and regions.

Target Date 31 May 1979

Progress On schedule.

Significant Deviations: None

Recommendations: 1. Continue tagging of beaver pelts and recording of data in 1977, using the same methods as in the current segment.

2. Although this year's harvest is significantly less than the previous year's, I do not interpret this as necessarily indicating a similar decline in beaver populations. Pelt prices were initially quite low and trapping effort was correspondingly less. Several long-time trappers have stated that they spent less time afield this year. Further, long-term trend information indicates an increase rather than a decline in the beaver harvest. Nuisance complaints dropped slightly from 111 in 1974 to 96 in 1975, but the cost of handling them was up from about $4,850 to about $5,025.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Harvests in individual towns do fluctuate considerably, particularly in those towns with normally high beaver populations. Parsons (N. Y. Fish Game J. 22:57-61, 1975) indicates that concentrated trapping pressure can significantly reduce localized populations. Fluctuations in individual towns are probably due to a period of heavy trapping, followed by a period of lesser effort as the trapper's take declines. When populations have recovered trapper effort and harvest again increases.

3. I understand some trappers wish to eliminate the two-week November portion of the season on the basis that the pelts are not yet prime. This may be justification for them. On the basis of harvest trends, however, I see no evidence of a continuing population decline and no present necessity for reducing the season. Harvests for 1976-77 should be compared with the current harvests and recommendations revised then, if necessary.

Cost: $859.51 (project leader man days - 10)

Remarks: Procedures: Each successful beaver trapper is required by law to present his pelts to an official checking station for tagging and recording of data. Seven stations are maintained for two days at the close of the season. Pelts are tagged with locking metal game seals and harvest data are recorded on mimeographed forms and subsequently tabulated by month trapped, town and county trapped in, and type of trap used.

Findings: The 1975-76 beaver trapping season extended for 15 weeks from 15 November 1975 to 1 March 1976. Trappers took 1,135 beaver during this period. This take was 309 less than last season's harvest of 1,441 and 84 less than a ten-year (1966-1975) average of 1,219. There were 107 trappers (116 in 1974-75) taking a minimum of one beaver each, with a mean harvest of 10.6 beaver per trapper (range: 1 to 72).

Beaver harvests for 1974-75 and 1975-76 for the five western counties were compared statistically by chi-square test for goodness of fit (Table 1). Harvests declined significantly (99% level) in all counties except Worcester. Current harvests were also compared with ten-year (1966-1975) counts and state means (Table 2). Franklin county showed a highly significant (99%) decline. Non-significant changes were recorded in Berkshire, Hampshire and Worcester counties. Hampden County showed no change.

The 1975-76 harvest in the western region (those towns west of the Connecticut River) was significantly less (99% level) than both the 1974-75 take and the ten-year mean (Table 3). The eastern region, however, showed no significant change from either the previous season or the ten-year mean.

Harvest trends were examined by comparing mean harvests for the five seasons from 1967-71 to the five seasons from 1972-76 (Table 4). The five western counties, both regions, and the statewide total all show highly significant (99% level) increases in the harvest trend.

Harvests were also examined for several individual towns. Current harvests for the 12 towns with the highest ten-year (1966-1975) mean takes were compared with the past year's harvest and with the ten-year mean (Table 5). Highly significant (99% level) declines from 1974-75 showed for seven towns while the five remaining towns had non-significant changes. In comparison with the ten-year mean, three towns showed highly significant decreases, two highly significant increases, one a significant (95% level) increase, and six showed non-significant changes. However, when these same towns were also compared for the five-year periods, 1967-71 and 1972-76, an increasing trend is still evident. Nine towns showed highly significant increases in the harvest trend, while three had non-significant changes.

Towns with lesser harvest rates probably also experienced fluctuations in harvest trends. The three lowest towns with ten-year mean harvests of at least ten beaver all show non-significant changes in harvest trends (Table 6).

Beaver colonies located in 102 towns contributed to the 1975-76 harvest (Figure 1).Berkshire and Franklin counties yielded slightly over one-half (586, 51.7%) of the harvest. Hampshire, Worcester and Hampden counties contributed another 476 beaver (41.9%), with Middlesex, Plymouth, Essex and County Unknown comprising the small remainder.

Success continues to be greatest in the first two weeks of the trapping season. Over one-half (573, 50.5%) of the beaver were taken from 15-30 November (Table 7) with another 352 (31.0%) taken in December. Slightly more were taken in February this season (78, 6.9%) than in 1974-75 (67, 4.6%), probably due to increased trapper effort in response to a late increase in pelt prices.

Use of the Conibear trap was up slightly this season, with 788 beaver (69.4%) taken in that style trap, as opposed to 906 (62.5%) in 1974-75. This increased usage of the Conibear may be due to precautionary shunning of the leghold trap which was subjected to a partial ban commencing 1 July 1975. Both the Conibear and the leghold are legal for drown-set beaver trapping, however.

Table 1. Analysis of beaver harvest by county, 1974-1975 and 1975-1976.

County	1974-75 Harvest	1975-76 Harvest	X^2	Sig. Diff./Level	
Berkshire	505	356	106.324	Yes	.01
Franklin	324	230	65.689	Yes	.01
Hampshire	263	187	52.850	Yes	.01
Hampden	138	119	5.650	Yes	.05
Worcester	164	170	0.432	No	
Statewide*	1,441	1,135	147.479	Yes	.01

* Includes also Essex, Middlesex and Plymouth Counties.

Table 2. Analysis of beaver harvest by county, 1975-1976 and ten-year mean.

County	Ten-year Mean	1975-76 Harvest	X^2	Sig. Diff./Level	
Berkshire	392	356	3.306	No	
Franklin	270	230	9.259	Yes	.01
Hampshire	180	187	0.272	No	
Hampden	119	119	0	No	
Worcester	192	170	2.521	No	
Statewide*	1,219	1,135	5.788	Yes	.05

* See footnote on Table 1.

Table 3. Analysis of beaver harvest by region, 1974-75 to 1975-76 and ten-year mean to 1975-76.

Region	1974-75 Harvest	1975-76 Harvest	X^2	Sig. Diff./Level	
Western	1,026	698	258.990	Yes	.01
Eastern	415	428	0.802	No	

Region	Ten-Year Mean	1975-76 Harvest	X^2	Sig. Diff./Level	
Western	813	698	16.267	Yes	.01
Eastern	403	428	1.551	No	

Table 4. Analysis of beaver harvest by county and region, 1967-1971 to 1972-1976.

Area	1967-1971 Mean Harvest	1972-1976 Mean Harvest	X^2	Sig. Diff./Level	
Berkshire	300	465	149.298	Yes	.01
Franklin	193	334	162.534	Yes	.01
Hampshire	130	240	143.494	Yes	.01
Hampden	79	149	94.911	Yes	.01
Worcester	164	197	12.168	Yes	.01
Western	588	970	398.607	Yes	.01
Eastern	389	478	36.933	Yes	.01
Statewide*	927	1,489	552.834	Yes	.01

* See footnote Table 1.

Table 5. Analysis of beaver harvest for 12 towns, 1974-1975 to 1975-1976 and ten-year mean to 1975-1976.

Town	1974-75 Harvest	1975-76 Harvest	X^2	Sig. Diff. Level	Ten-year Mean	1975-76 Harvest	X^2	Sig. Diff. Level
Petersham	42	37	1.271	No	64	37	11.391	Yes .01
Otis	85	50	38.912	Yes .01	49	50	0.020	No
Sandisfield	73	35	61.038	Yes .01	47	35	3.064	No
New Marlboro	36	12	64.000	Yes .01	46	12	25.130	Yes .01
Becket	60	41	14.822	Yes .01	42	41	0.024	No
Worthington	21	45	40.228	Yes .01	32	45	5.281	Yes .05
Blandford	59	52	1.772	No	34	52	9.529	Yes .01
New Salem	32	49	14.929	Yes .01	30	49	12.033	Yes .01
Ashfield	25	14	13.483	Yes .01	28	14	7.000	Yes .01
Tolland	14	19	3.102	No	28	19	2.893	No
Winchendon	27	24	0.708	No	28	24	0.571	No
Hardwick	20	22	0.382	No	25	22	0.360	No

Table 6. Analysis of beaver harvest for 15 towns, 1967-71 to 1972-76.

Town	1967-71 Mean Harvest	1972-76 Mean Harvest	X^2	Sig. Diff./Level	
Petersham	62	52	3.536	No	
Otis	31	67	61.149	Yes	.01
Sandisfield	46	41	1.153	No	
New Marlboro	34	47	8.566	Yes	.01
Becket	32	52	20.192	Yes	.01
Worthington	17	50	85.839	Yes	.01
Blandford	15	51	111.812	Yes	.01
New Salem	18	42	45.714	Yes	.01
Ashfield	32	40	8.100	Yes	.01
Tolland	15	31	25.325	Yes	.01
Winchendon	21	36	16.964	Yes	.01
Hardwick	21	24	0.803	No	
Shelburne	11	9	1.818	No	
Townsend	8	12	3.333	No	
Lenox	8	10	0.900	No	

Table 7. Beaver harvest by month, 1974-75 and 1975-76.

Month	1974-75 No. Beaver	1974-75 Percent	1975-76 No. Beaver	1975-76 Percent
November	721	50.0	573	50.5
December	449	31.2	352	31.0
January	176	12.2	100	8.8
February	67	4.6	78	6.9
March	---	----	4	0.4
Not Stated	28	2.0	28	2.4
Totals	1,441	100.0	1,135	100.0

MASSACHUSETTS

CITY AND TOWN LINES

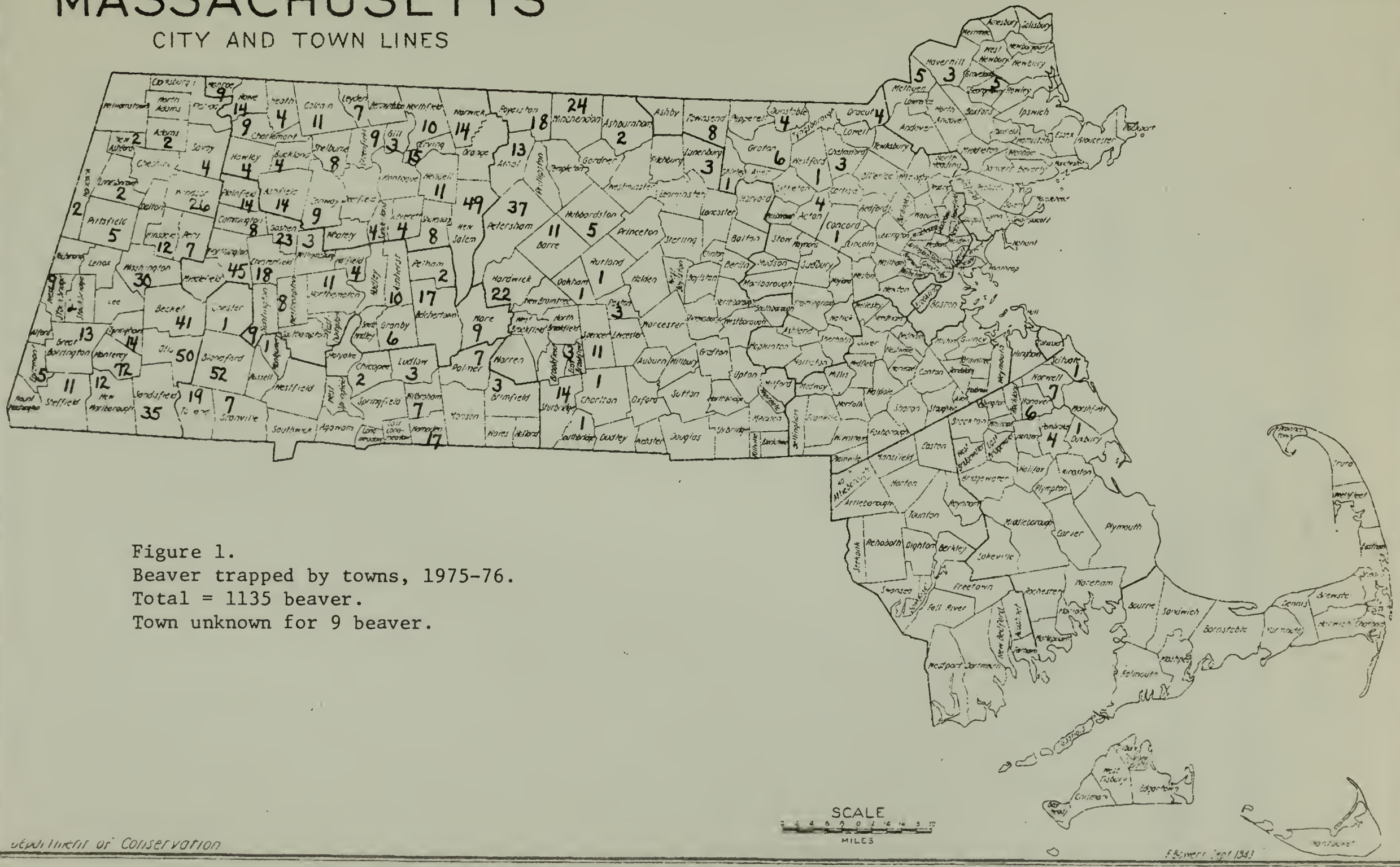

Figure 1.
Beaver trapped by towns, 1975-76.
Total = 1135 beaver.
Town unknown for 9 beaver.

Average spring prices were about $19 per pelt, for an estimated harvest valuation of $21,565.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by _____
James E. Cardoza, Game Biologist

Date _____

PERFORMANCE REPORT

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State Massachusetts Project No. W-35-R-18

Project Title Game Population Trend and Harvest Survey

Project Type Research and Survey

GOVERNMENT DOCUMENTS COLLECTION MAY 24 1977 UNIVERSITY OF

Period Covered: 1 June 1975 to 31 May 1976

Work Plan II Massachusetts White-Tailed Deer Study

Plan Objectives: To determine through the collection and analysis of pertinent deer harvest data, the sex and age structure of the herd and to develop management and harvest procedures based on project findings.

Job II-1 Statewide Deer Harvest

Job Objectives: To determine the annual harvest of deer in Massachusetts.

Summary: The 1975 statewide deer harvest for all deer seasons was 2,522 deer which is a decrease of 257 deer below the 1974 harvest of 2,779 deer. The reason for the decline in the harvest was not determined. Seventy percent of the deer harvest was reported in the four western counties of Berkshire, Franklin, Hampden and Hampshire. Worcester County contributed 9 percent of the statewide harvest and Barnstable contributed 4 percent. The islands of Dukes County reported 8 percent and Nantucket contributed 7 percent of the reported harvest. Deer management zones one and two contributed 1 percent each to the overall statewide deer harvest.

Target Date: 31 August 1976

Progress: On schedule.

Deviations: None

Recommendations: Continue this job. See Job II-4 for future recommendations.

Cost: $65,000

Presentation of Data:

Introduction

In Massachusetts there are four different types of deer hunting seasons. In 1975 (1) a two-day special hunt for paraplegic deer hunters was held on 3-4 November; (2) the 18-day archery season continued from 8 November through 27 November; (3) the six-day shotgun deer season, 1 December through 6 December; and (4) the three-day primitive weapon season from 8 December through 10 December. Hunting is not allowed on Sundays.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Since 1967, Massachusetts has had a statewide antlerless deer hunting permit system for the shotgun season. All hunters may legally harvest a deer with antlers three inches and longer. To harvest a female or a male with antlers less than three inches, the hunter must have been issued an antlerless deer hunting permit. All hunters during all four deer hunting seasons are required to bring their deer to an official deer checking station to be recorded and tagged within 24 hours of harvesting a deer.

Antlerless deer hunting permits are issued on a deer management unit basis. The number of sportsmen's permits per management unit, the deer shotgun harvest per sex, rank of importance, and the percent of the total harvest per management unit is presented in Table 1.

Archery Season

In 1972, the archery season was expanded from 12 days to an 18-day season. A summary of the statewide archery harvest below shows an increase from 76 deer in 1972 to 113 in 1975.

Summary of the Massachusetts Archery Harvest, 1967-1975:

	1967	1968	1969	1970	1971	1972	1973	1974	1975
Male	17	21	27	24	26	49	51	62	74
Female	4	13	10	12	10	27	26	25	39
	21	34	37	36	36	76	77	87	113

The mainland archers reported 96 deer taken consisting of 62 males and 34 females. The four mainland counties with the highest archery harvest in order of importance were Berkshire (34 deer), Franklin (18 deer), Worcester (15 deer), and Hampshire (13 deer).

The Nantucket archers reported 14 deer (10 males and 4 females). Three deer were reported by Martha's Vineyard bowmen (2 males and 1 female, see Table 2).

Paraplegic Season

Paraplegic hunters took 3 male and 2 female deer during the two-day special season on Martha's Vineyard

Primitive Firearms Season

During the special three-day primitive firearms deer season, the hunters reported harvesting 24 deer statewide (11 males and 13 females). The kill per county in order of importance is as follows: Berkshire, 10; Hampshire, 4; Worcester, 3; Hampden, 3; Dukes, 2; Barnstable, 1 and Nantucket, 1 (Table 2).

Shotgun Season

During the six-day shotgun only deer season, hunters reported harvesting 2,353 deer. Of these deer, 1681 were males (199 male fawns) and 672 were females (Table 2). The four top deer-producing counties were Berkshire (843), Franklin (425), Hampden (224) and Worcester (208) as indicated on Table 1. The reported shotgun deer harvest of 2353 represents 93 percent of the total deer harvest statewide.

Deer harvest data shows that 1366 adult males, 138 fawn males and 521 females, a total of 2025 deer, were taken on the mainland. The Nantucket deer hunters reported 163 deer consisting of 62 adult males, 27 male fawns and 74 females. On Martha's Vineyard, a total of 165 deer were reported taken (54 adult males, 34 male fawns and 77 females). The Gosnold Island hunters reported taking 10 males and 28 females.

A summary of the 1975 Massachusetts shotgun deer harvest by sex and the county rank of importance from 1970 through 1975 is presented in Table 3. Berkshire and Franklin counties have remained the top-ranking counties for the past six years. Hampden and Worcester counties remain in the third and fourth slots unchanged since 1974. Hampshire and Dukes counties swapped rankings with Hampshire moving in the fifth ranking position. Nantucket remained unchanged from the 1974 rank. With the exception of Barnstable, the remaining counties may fluctuate from year to year, but harvest in any county is seldom over 30 deer per year.

Total Harvest Figures

Appendix 1 presents a ten-year summary (1966-1975) of the annual deer harvest by town and county. There was a decrease of 257 deer below the 1974 kill of 2,779 deer. All preshotgun season indices (statewide reported deer mortalities and the 1975 archery deer hunter success) indicated that the 1975 shotgun season harvest should exceed the 1974 kill. However, the final tally showed only 2,522 deer reported for the 1975 deer seasons. The reason for the decline in the 1975 season has not been determined. It is speculated that a combination of factors such as unseasonably high temperatures, a lack of snow and lack of hunting pressure may have influenced the harvest. Many hunters reported seeing more deer this year.

From 1967 through 1971, there was an annual increase (from 20 to 39 percent) in the female deer harvest due to an increase in the number of antlerless permits issued. In 1972, the number of antlreless permits was reduced to 4,000 permits on the mainland. From 1973 through 1975, the percent of females in the total harvest has remained at a healthy 30 percent as shown below:

Percent of Females in the Total Harvest

1967	1968	1969	1970	1971	1972	1973	1974	1975
20%	23%	29%	32%	39%	34%	30%	30%	30%

Table 4 presents a summary of the 1975 deer harvest per sex per management unit. The statewide harvest per sex since 1967 is presented as follows:

Kill Statewide for Each Sex, 1967 through 1975

	1967	1968	1969	1970	1971	1972	1973	1974	1975
Male	954	1104	1451	1629	1385	1504	1477	1949	1779
Female	239	323	595	776	899	787	644	832	754
Total	1193	1427	2046	2406	2284	2291	2121	2781	2533

The ratio of male to female deer determined from the statewide deer harvest for 1975 was one male to .42 females. This ratio has remained constant since 1973. The ratio of male to female in the deer harvest fluctuated with the number of antlerless permits issued. In 1967 and 1968, 2000 sportsmen's permits were issued and the sex ratio was 1 male to .25 females and 1 male to .29 females, respectively. In 1969, the number of permits was increased to 4000 and the male to female ratio was 1 male to .41 females. The number of antlerless permits was increased to 6000 permits and ratio of males to females in the harvest was 1 to .43 in 1970 and 1 to .65 in 1971. A slight decline was noted in 1972 of 1 male to .52 females with the reduction of 2000 permits to the present issuing of 4000 permits per year.

The shotgun, archery, primitive and paraplegic hunter harvest per sex per county for 1975 is presented in Table 2.

Antlerless Permit Data

An increase of 3000 antlerless permit applications was recorded for the 1975 season with 33,000 applicants compared to 30,000 applications in 1974. There were 4200 sportsman permits; 370 farmer-landowner permits; 400 Nantucket and 600 Martha's Vineyard antlerless permits issued in 1975. Due to an oversight at the card sorting machine, it was necessary to issue an additional 200 permits for Frankli County. This accounts for the increase to 4200 permits in 1975 above the 4000 permits issued in 1974. The 1975 harvest of deer by antlerless permit holders was 1012 deer (Table 5).

In 1975, the 365 farmer-landowner permittees reported harvesting 71 deer. Nineteen percent of the 370 permit holders reported taking a deer (Tables 5 and 6).

Table 7 presents a summary of the deer harvest per sportsmen's permit per deer management unit and the success ratio of antlerless permit holders for 1975. The permit holders success ratio remained about the same as for the 1974 shotgun season with a ratio of 1 to 6 on the mainland; 1 in 4 on the Vineyard, and 1 in 3 on Nantucket.

There were 400 antlerless permits issued for Nantucket Island. The harvest by permit holders showed that the harvest of male fawns was about the same as the previous year with 26 button bucks taken in 1974 and 27 male fawns reported in 1975. The antlerled male harvest by permittees decreased by 5 deer in 1975 with 17 reported and 22 reported in 1974. The female harvest by permittees increased 8 deer with 74 reported in 1975 and 66 reported in 1974. The total harvest by permittees was 118 deer in 1975, a slight increase of 4 deer above the 114 deer reported in 1974 (Table 5).

There were 600 antlerless permits issued for Martha's Vineyard. The permittees harvested 132 deer in 1975. This was a decrease of 17 deer less than the 149 deer reported by permit holders in 1974. There was a slight increase in the male fawns with 34 button bucks reported in 1975 compared to the 29 skippers reported in 1974. The 22 antlered males reported by permit holders in 1975 was 3 deer less than the reported 25 antlered bucks in 1974 (Table 5). There was a decrease of 19 females in the 1975 harvest with 76 reported compared to the 95 females in 1974.

The 4200 antlerless permit holders on the mainland reported harvesting 762 deer. There was a decrease of 23 male fawns from 148 in 1974 to 125 in 1975. The antlered male harvest doubled from 80 deer in 1974 to 161 in 1975. The female segment decreased by 126 from 602 females in 1974 to 476 females in 1975 (Table 5).

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Job II-2 Non-Hunting Deer Mortality Investigations

Job Objectives: To determine the annual non-hunting decimating factors of the Massachusetts deer herd.

Brief Summary: From 1 January to 31 December 1975, Natural Resource Officers reported 508 non-hunting deer mortalities. There were 188 males, 286 females and 34 deer with no sex reported resulting in an adjusted sex ratio of 39 percent males to 61 percent females. The highest cause of these mortalities was motor vehicles with 362 deer reported. Dogs caused 60 mortalities and there were 25 illegal kills, 29 dead of unknown causes and 32 from other causes.

Target Date: 31 December 1975

Status of Progress: On schedule.

Deviations: None

Recommendations: Project should continue as it presently exists.

Cost: $14,000

Presentation of Data:

Techniques

Natural Resource Officers report deer mortalities to the Law Enforcement Division in Boston. A copy of each report is provided to the Division of Fisheries and Wildlife.

Findings

From 1 January through 31 December 1975, Natural Resource Officers reported 508 deer mortalities. Of these, 188 were males, 286 females and no sex was reported on 34 deer. The number and causes in order of importance were as follows: motor vehicles, 362; dogs, 60; illegal, 25; crop damage and other causes, 17; fences, 7; drowned, 4; trains, 4; and unknown causes, 29 (Table 8).

A five-year summary, 1970 through 1975, is presented in Table 9 and compares the 1975 deer mortalities per cause with a five-year average. With the exception of the 1975 motor vehicle mortalities which is 10 deer above the five-year average of 352, the mortalities are below the five-year average.

The 508 deer mortalities reported in 1975 are 7.68 percent higher than the 469 deer reported in 1974 (Table 10).

The adjusted sex ratio (Table 11) for 1975 deer mortalities is as follows:

Adjusted Sex Ratio

200 males : 308 females
60 males : 100 females
39% males : 61% females

(1974 sex ratio =
42% males : 58% females)

Table 12 presents the non-hunting deer mortalities ranked by county, 1969 through 1975. The first three counties, in order of importance, were Berkshire, Franklin and Barnstable. These counties remain in the same rank as in 1974. Nantucket Island moved from tenth place to fourth this year. I believe the move was due to the stationing of a permanent Natural Resource Officer on the island.

Hampshire and Worcester counties are tied for fifth rank. Hampden County moved from ninth spot to sixth, while Essex County remained in seventh place. Middlesex County moved from tenth place to rank Number Eight. It is interesting to note that Dukes County dropped from sixth rank in 1974 to tenth rank in 1975.

* * * * * * * * * * * *

Job II-3 Deer Fertility Studies

Job Objectives: To determine the reproductive rate per age class of the Massachusetts deer herd.

Summary: This job was inactive during the period covered by this report.

Target Date: None

Progress Inactive

Deviations None

Recommendations: If funds are available, the job should be continued.

Cost: None

Remarks: Inadequate funds for transportation forced the inactive status of this job.

* * * * * * * * * * * *

Job II-4 Deer Management Recommendations

Job Objectives: To determine the size of the Massachusetts deer herd and to recommend management techniques that will provide the deer hunter with the greatest hunting opportunity commensurate with herd population levels.

Summary: There was a slight decline of 278 deer in the 1976 statewide shotgun deer harvest, yet the male fawn and female harvest made up 38 percent of the harvest. This percentage has remained unchanged for the past three years and we have no explanation of the decline at this time. The predicted increase in the 1-1/2 year old male class occurred in 1975 with 303 1-1/2 year old males aged at mainland biological deer check stations. There were 255 1-1/2 year old males reported in 1974.

The calculated minimal population, based on the percent of 1-1/2 year old males reported at the biological deer check stations, was 11,975 deer. This is an eight percent decrease from the 1974 minimal population figure of 12,984 deer.

The percent frequency ratio of adult females to adult males on the mainland was .27 while on Martha's Vineyard the frequency ratio was .90, and on Nantucket the ratio was .70. The percent frequency ratios for the shotgun only season were slightly lower.

The success ratio of antlerless permit holders for 1975 on the mainland was 1 : 6. On Martha's Vineyard, the success ratio was 1 : 4 and on Nantucket, the ratio was 1 : 3 for successful permit holders.

Target Date: 30 June 1976

Progress: On schedule

Deviations: None

Recommendations: The following numbers of sportsmen's antlerless permits issued per county and/or region are suggested:

County	Number of Sportsmen Antlerless Permits
Barnstable	200
Berkshire	1300
Franklin	700
Hampden	400
Hampshire	300
Worcester	700
Region I*	200
Region II**	200
Martha's Vineyard	600
Nantucket	400
Naushon	50

* Region I - Essex, Middlesex and Norfolk Counties
** Region II - Bristol and Plymouth Counties

The application number of the antlerless permits beginning with first and last numbers for each county and for each type of permit should be recorded and filed in the deer project files. This data will facilitate the programming and the analysis of the deer harvest by permit holders.

Cost: $750

Presentation of Data:

An eight-year summary of the sex and age composition of Massachusetts deer at biological deer check stations on the mainland and for five years on Martha's Vineyard and Nantucket Island is presented in Table 13. Interestingly, although the mainland deer harvest was lower in 1975 than the 1974 harvest. The predicted increase of 1-1/2 year old males did occur in 1975 (Table 13). There were 255 1-1/2 year old males reported on mainland biological stations in 1974. The 1975 harvest of 1-1/2 year old

males was 303 reported at the biological stations. With the exception of the decline in the expected harvest in 1975, the sex and age composition on the mainland and the island appear to be in good shape (Tables 13, 14, 15, and 16).

Table 17 presents a summary of the Massachusetts shotgun deer harvest from 1967 through 1975. The statewide shotgun harvest was 2391 deer which is a decline of 278 deer. The greatest decline in 1975 was in adult males (1492) when compared to the 1974 kill of 1665 adult males. There was a small decline of 14 male fawns (199) from the 1974 harvest. The adult female harvest was down by 85 deer (478) in 1975 compared to the 1974 kill of 563 adult does. The smallest decline in the harvest was the 6 fawn females with 222 reported in 1975 and 228 shot in 1974. Thirty-eight percent of the total deer reported during the shotgun season were button bucks and does. The 38 percent figure has remained constant for the past three years of 1973 through 1975.

A summary of percent change in adult harvest and calculated minimal populations of deer in Massachusetts, 1967 through 1975, is presented in Table 18. There was a decrease of 11.6 percent in the adult male harvest with 1665 adult bucks reported in 1974 and only 1492 adult males taken in 1975. As a result of the decrease in the adult male harvest, all calculated populations showed varying percentages of decrease. No explanation for the decline of the deer harvest can be offered at this time. However, I believe that there were adequate deer present in the herd so that the harvest could have reached 2800 to 3000 deer statewide in 1975. This was based on mortality reports and reported sightings of numbers of deer by Natural Resource Officers and Division personnel. In other words, the deer were there, but the hunters just did not harvest them.

Tables 19 and 20 present a summary of the adult male and female harvest per square mile of deer range per county in Massachusetts from 1970 through 1975. The statewide deer range per square mile data was recently updated using aerial photos taken in 1970 (Land Use Changes and the Massachusetts Deer Herd, 1976, Phillip J. Sczerzenie, Massachusetts Cooperative Wildlife Research Unit, University of Massachusetts, Amherst, Massachusetts). Prior to the updating, the deer range per square mile was based on aerial photographs taken in 1950 and 1951.

The number of adult males per county (Tables 19, 20, and 21) was computed by subtracting the number of male fawns from the reported male harvest found in Table 2. The adult female harvest (Tables 19 and 20) was determined by subtracting the percent of female fawns from the total reported female harvest per county. The percent of female

fawns was computed from the reported female harvest at the biological stations (Tables 14, 15 and 16). The adult male and female harvest per county was determined by dividing the square miles of deer range per county into the adult harvest (Tables 19 and 20).

The decline in the 1975 deer harvest was reflected in all counties with a slight decline in the adult harvest per square mile of deer range. This was true for both adult sexes except for an increase in the adult male harvest in Hampshire County. In 1974, .27 adult males were reported and in 1975, .34 adult bucks per square mile were reported in Hampshire County.

The computed harvest of adult males per square mile of deer range for the mainland in 1975 was .25 antlered bucks. This is .02 of a buck lower than the high of .27 adult males reported in 1974. There was a decline of .14 antlered males in Dukes County with .70 adult males reported in 1975 and .84 reported in 1974. There was an unexpected increase in the adult male harvest reported on Nantucket Island with 1.99 males reported in 1975 and 1.69 reported in 1974 (Table 19).

The adult female harvest reported on the mainland declined slightly in 1975 with .07 adult does harvested per square mile of deer range compared to a harvest of .08 adult females reported in 1974. There was a decline of .04 adult does per square mile of deer range in Dukes County with .63 females reported in 1975 and .67 adult females reported in 1974. There was an increase of .19 adult does reported taken on Nantucket Island in 1975 with 1.39 adult females reported in 1975 and 1.20 adult does taken in 1974 (Table 20).

A summary of the total harvest of deer in Massachusetts (including shotgun, archery and muzzle loader harvest) per county per sex and the harvest of deer per square mile of deer range in Massachusetts for 1975 is presented in Table 21.

The statewide harvest of deer per square mile of deer range was .42 in 1976. Of the .42 deer, .30 were males and .12 were females. There was a decline of .02 deer per square mile from the 1974 harvest of .44 deer per square mile (Table 21).

Table 22 presents the percent frequency ratio of adult females to adult males from 1968 through 1975. Although there was a decline in the deer harvest for 1975, the mainland deer herd appears to be in good shape in regard to the harvest of adult females to adult males (Table 22). On Martha's Vineyard, the adult harvest is approaching a one-to-one frequency and it may be necessary to reduce the number of antlerless permits if it appears that the overall herd is being overharvested.

There was a slight increase in the Nantucket harvest and yet the adult male to adult female frequency (.69 in 1974 to .70 in 1975) has not changed significantly (Table 22).

Table 23 presents a summary by deer management unit of the shotgun deer harvest, the number of sportsmen antlerless permits issued, the harvest per square mile of deer range for adult male and female deer and the percent frequency ratio of adult females to adult males for 1975. All indices (adult harvest per square mile of deer range, percent frequency adult male to adult female ratios and the male fawn harvest) suggest that the mainland deer herd is in good biological balance; i.e., no out of proportion harvest of any sex or age of deer herd. In Dukes County the adult deer harvest is almost one adult male to an adult female. The Nantucket harvest of adult males to adult females shows that for every 100 adult males taken 77 adult females are harvested. Apparently the Nantucket deer herd can stand the pressure for another year before it is recommended to reduce the number of antlerless permits for the island.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research & Management

Approved: _____
Richard Cronin, Superintendent

Prepared by _____
James J. McDonough, Game Biologist

Date _____

Table 1. Summary of the Number of Sportsmen's Antlerless Permits Issued, the Deer Harvest per Deer Management Unit, the Sex of the Harvest, the Ranking order of Importance as a Deer-Producing Unit, and the Percent of the Harvest by Unit for 1975.

Unit	Number Antlerless Permits	Male	Female	Total	Rank	Percentage of Total
Berkshire	1,300	628	215	843	1	36
Franklin	700	299	126	425	2	18
Hampden	400	170	54	224	3	10
Worcester	700	151	57	208	4	9
Hampshire	300	142	33	175	5	7
Martha's Vineyard***	600	88	77	165	6	7
Nantucket	400	89	74	163	7	7
Barnstable	200	72	15	87	8	4
Region II**	200	22	12	34	9	1
Region I*	200	20	9	29	9	1
	5,000	1,681	672	2,353		

* Region I includes Middlesex, Norfolk, Essex and Suffolk Counties.
** Region II includes Bristol and Plymouth Counties.
*** Gosnold's 10 males and 28 females not included.

Table 2. A Summary of the Shotgun, Archery and Primitive Firearms Hunter Harvest by County for 1975 in Massachusetts

County	Shotgun				Archery				Primitive Firearms				Total				% of Total
	M	F	T	BB	M	F	T	BB	M	F	T	BB	M	F	T	BB	
Barnstable	72	15	87	3	3	0	3			1	1		75	16	91	3	4.0
Berkshire	628	215	843	50	19	15	34		4	6	10		651	236	887	50	35.0
Bristol	5		5										5		5		0.2
Dukes*	88	77	165	34	2	1	3		5**	2**	7**		95	80	175	34	7.0
Essex	15	4	19	2	1	2	3						16	6	22	2	0.8
Franklin	299	126	425	37	13	5	18						312	131	443	37	17.5
Hampden	170	54	224	15	5	5	10		1	2	3		176	61	237	15	9.4
Hampshire	142	33	175	9	11	2	13		2	2	4		155	37	192	9	7.5
Middlesex	4	4	8										4	4	8		0.3
Nantucket	89	74	163	27	10	4	14		1		1		100	78	178	27	7.0
Norfolk	1	1	2										1	1	2		0.1
Plymouth	17	12	29	1									17	12	29	1	1.1
Suffolk																	0.0
Worcester	151	57	208	18	10	5	15		1	2	3		162	64	226	18	8.6
Gosnold	10	28	38	3									10	28	38	3	1.5
Totals	1,691	700	2,391	199	74	39	113		14	15	29		1,779	754	2,533	199	

* Gosnold not included.
** Paraplegic deer hunt - 3 males and 2 females included.

Table 3. County Summary of the 1975 Massachusetts Shotgun Deer Harvest by Sex and the County Rank in Order of Importance from 1970 through 1975.

County	Male	Female	Total	Rank 1975	Rank 1974	Rank 1973	Rank 1972	Rank 1971	Rank 1970
Barnstable	72	15	87	8	8	8	8	7	8
Berkshire	628	215	843	1	1	1	1	1	1
Bristol	5		5	12	11	12	12	12	12
Dukes*	88	77	165	6	5	3	3	3	7
Essex	15	4	19	10	9	9	9	10	9
Franklin	299	126	425	2	2	2	2	2	2
Hampden	170	54	224	3	3	5	4	5	6
Hampshire	142	33	175	5	6	7	6	8	4
Middlesex	4	4	8	11	12	11	11	9	10
Nantucket	89	74	163	7	7	6	7	6	5
Norfolk	1	1	2	13	13	13	13	13	13
Plymouth	17	12	29	9	10	10	10	11	11
Suffolk			0	14	13	13	13	13	13
Worcester	151	57	208	4	4	4	5	4	3
Total	1,681	672	2,353						
Gosnold	10	28	38						
	1,691	700	2,391						

* Gosnold not included.

Table 4. A Summary of the 1975 Deer Harvest Per Sex Per Management Unit

Unit	Males	Females	Total	Male Fawns
Berkshire	628	215	843	50
Franklin	299	126	425	37
Worcester	151	57	208	18
Hampshire	142	33	175	9
Hampden	170	54	224	15
Region I	20	9	29	2
Region II	22	12	34	1
Barnstable	72	15	87	3
Martha's Vineyard	88	77	165	37
Nantucket	89	74	163	27
Gosnold	10	28	38	
Totals	1,691	700	2,391	199

* Gosnold not included

Table 5. Number of Permits and Deer Harvest by Permittees from 1968 through 1975 per Deer Management Unit in Massachusetts

	1968	1969	1970	1971	1972	1973	1974	1975
Permit Applications*	24,000	32,000	35,000	37,500	38,000	32,000	30,000	33,000
Mainland Permits	2,000	4,000	6,000	6,000	4,000	4,000	4,000	4,200
Adult Male		99	124	104	55	67	80	161
Fawn Male		107	183	175	136	102	148	125
Female		473	612	698	531	396	602	476
Totals		679	919	972	722	565	830	762
Farmer-Landowner Permits	331	295	347	270	326	349	358	370
Button Buck								10
Male	21	17	25	20	14	19	38	21
Female	44	45	34	26	42	37	42	40
Totals	65	62	59	46	56	56	80	71
Nantucket Permits		400	400	400	400	400	400	400
Adult Male		29	15	26	23	22	22	17
Fawn Male		11	24	29	17	29	26	27
Females		49	85	70	61	65	66	74
Totals		89	124	125	101	116	114	118
Martha's Vineyard Permits				600	600	637**	600	600
Adult Male		1	0	30	24	21	25	22
Fawn Male		0	1	41	37	35	29	34
Females		19	38	95	126	117	95	76
Totals		20	39	166	187	173	149	132
Total Permits Issued	2,331	4,695	6,747	7,270	7,326	5,386	5,358	5,565
Deer (both sexes)	356	788	1,082	1,260	1,010	854	1,093	1,012

* Round figures

** Includes Naushon Island

Table 6. A Summary of the Massachusetts Deer Harvest per Farmer-Landowner Permit per County for the 1975 Shotgun Season

County	Number Issued	Harvest			
		Male Fawns	Adult Males	Females	Total
Barnstable	2				
Berkshire	94	3	2	15	20
Bristol	1				
Dukes	0		1		1
Essex	0				
Franklin	145	5	5	19	29
Hampden	43	2	1	4	7
Hampshire	50	1	7	4	12
Middlesex	0				
Nantucket	0				
Norfolk	1				
Plymouth	0				
Suffolk	0				
Worcester	34		2		2
Totals	370	11	18	42	71

Table 7. A Summary of the Massachusetts Deer Harvest per Sportsman's Antlerless Permit per Deer Management Unit and the Success Ratio of Antlerless Permit Holders for 19[illegible]5*.

County	Number of Applications	No. of Permits Awarded	No. of Antlerless Deer Harvest by Permit				Ratio of Deer per Antlerless Permit					Success Ratio
			Button Buck	Adult Male	Total Male	Female	Button Buck	Adult Male	Total Male	Female	Deer	Deer: Antlerless Permit
Berkshire	9,532	1,300	47	45	92	198	1:27	1:29	1:14	1:7	290	1:4
Franklin	8,599	900	36	16	52	105	1:25	1:56	1:17	1:9	157	1:6
Worcester	4,918	700	17	8	25	57	1:41	1:83	1:28	1:12	82	1:9
Hampshire	2,586	300	9	5	14	31	1:33	1:60	1:21	1:10	45	1:7
Hampden	2,561	400	13	12	25	52	1:31	1:33	1:16	1:8	77	1:5
Region I	652	200	3	1	4	8	1:67	1:200	1:50	1:25	12	1:17
Region II	789	200		2	2	12		1:100	1:100	1:17	14	1:14
Barnstable	1,810	200	2	1	3	17	1:100	1:200	1:66	1:12	20	1:10
Mainland Total	31,447	4,200	127	90	217	480	1:33	1:47	1:19	1:9	697	1:6
Martha's Vineyard	777	600	35	23	58	79	1:17	1:26	1:10	1:8	137	1:4
Nantucket	621	400	27	19	46	74	1:15	1:21	1:8	1:5	120	1:3
Statewide	32,845	5,200	189	132	321	633	1:28	1:39	1:16	1:8	954	1:5

* Farmer-Landowner permits not included.

Table 8. A Summary of Massachusetts Deer Mortalities Reported by Natural Resource Officers, 1 January through 31 December 1975

	January			February			March			April			May			June		
	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex
Motor Vehicles	4	9	2	6	7		5	11		7	20	3	11	23	2	11	27	2
Dogs	2	4		4	12	1	4	3	3	1	12		1			2	1	1
Illegal Kill			1		1		1			1	2	1				1	1	
Drowned																		
Fences	1			1				1			1		1	1				
Trains				1												1		
Crop Damage and Others					2						2							
Unknown	1	1			1			1		4	3	1	1					
Subtotal	8	14	3	12	23	1	10	16	3	13	40	5	14	24	2	15	29	3
Total (Cum. Total)	25			36	(61)		29	(90)		58	(148)		40	(188)		47	(235)	

	July			August			September			October			November			December		
Motor Vehicles	10	16	1	1	9		10	8	1	17	34	3	43	20	4	4	29	2
Dogs											1		3	2		2	1	
Illegal Kill								1		2	1	1	3	3		2	3	
Drowned											1			1		1	1	
Fences													1					
Trains											1					1		
Crop Damage and Others	1															7	5	
Unknown				1			2	1		2		2	3	1	2		1	
Subtotal	11	16	1	2	9	1	12	10	1	21	38	6	53	27	6	17	40	2
Total (Cum. Total)	28	(263)		12	(275)		23	(298)		65	(363)		86	(449)		59	(508)	

Cause	Male	Female	Unknown Sex	Total
Motor Vehicles	129	213	20	362
Dogs	19	36	5	60
Illegal Kills	10	12	3	25
Drowned	1	3		4
Fences	4	3		7
Trains	3	1		4
Crop Damage & Others	8	9		17
Unknown	14	9	6	29
Totals	188	286	34	508

Table 9. Five-year summary of deer mortalities of Massachusetts deer reported by Natural Resources officers, 1970 through 1975

Cause	1970	1971	1972	1973	1974	1975	5-yr Avg.	Total
Motor Vehicles	400	373	321	321	347	362	352	1762
Dogs	204	219	41	36	33	60	106	533
Illegal Kills	25	39	44	23	35	25	33	166
Crop Damage	14	4	1	2	1	0	4	22
Unknown Causes	38	41	35	21	33	29	34	168
All Other Causes	17	18	11	15	18	32	16	79
Totals	698	694	453	420	469	508	546	2730

Table 10. A comparison of total non-hunting deer mortalities of Massachusetts deer from 1969 through 1975.

	1969	1970	1971	1972	1973	1974	1975
No. of Deer	682	698	694	453	420	469	508
Percent Change		2%	-.6%	-34.7%	-7.3%	+10.4%	+7.68

Table 11. Comparison of actual numbers of deer mortalities by sex* and adjusted data for Massachusetts deer per month, 1975.

Month	Male	Female	Unknown Sex	Total	Adjusted Male	Adjusted Female
January	8	14	3	25	9	16
February	12	23	1	36	12	24
March	10	16	3	29	11	18
April	13	40	5	58	14	44
May	14	24	2	40	15	25
June	15	29	3	47	16	31
July	11	16	1	28	11	17
August	2	9	1	12	2	10
September	12	10	1	23	13	10
October	21	38	6	65	23	42
November	53	27	6	86	57	29
December	17	40	2	59	17	42
Total	188	286	34	508	200	308

Adjusted Sex Ratio

200 males : 308 females
65 males : 100 females
39% males : 61% females

* These data were reported by Natural Resource officers.

Table 12. The Massachusetts non-hunting deer mortalities ranked by county, 1969 through 1975

County	1969		1970		1971		1972		1973		1974		1975	
	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank
Barnstable	63	4	74	4	93	2	72	2	76	2	56	3	54	3
Berkshire	168	1	184	1	175	1	92	1	109	1	148	1	203	1
Bristol	15	11	8	11	6	11	6	11	6	9	6	11	5	10
Essex	34	8	32	7	25	9	20	9	20	6	23	7	24	7
Franklin	90	3	127	2	90	3	66	3	73	3	62	2	58	2
Hampden	52	5	47	6	51	6	45	5	28	5	19	9	28	6
Hampshire	51	6	56	5	65	5	38	6	28	5	37	5	30	5
Middlesex	37	7	22	8	18	10	8	10	14	8	13	10	12	8
Norfolk	5	12			1	13	6	10	3	10	4	12	2	11
Plymouth	27	9	22	8	36	8	21	8	17	7	20	8	11	9
Suffolk	0	14	0	14	0	14	0	14	0	14	0	13	0	12
Worcester	104	2	99	3	99	3	55	4	37	4	42	4	30	5
Dukes	15	11	17	9	17	9	22	7	6	9	24	6	5	10
Nantucket	21	10	11	10	11	10	2	12	3	10	13	10	48	4

Table 13. Age composition of mainland Massachusetts male deer checked at biological stations, 1968 through 1975.

Age	1968	1969	1970	1971	1972	1973	1974	1975
6 mos.	61	67	121	100	77	69	78	80
1-1/2	193	229	263	211	260	237	255	303
2-1/2	126	133	147	103	144	173	156	151
3-1/2	87	98	97	77	96	90	86	97
4-1/2	35	55	59	43	46	47	35	36
5-1/2	17	21	21	19	14	13	11	9
6-1/2	4	14	7	3	11	7	5	12
7-1/2	0	2	7	6	2	6	4	5
8 to 9-1/2	0	2	1	1	0	3	0	2
10-1/2	0	1	0	0	0	0	0	0
Totals	528	652	723	563	563	650	730	695

Table 14. Age composition of mainland Massachusetts female deer checked at biological stations from 1968 to 1975.

Age	1968	1969	1970	1971	1972	1973	1974	1975
6 mos.	44	76	90	101	90	62	62	71
1-1/2	33	55	54	64	57	48	53	50
2-1/2	28	55	69	69	56	42	51	42
3-1/2	16	36	46	51	51	35	33	33
4-1/2	11	24	29	33	22	25	23	15
5-1/2	3	11	14	20	14	6	8	10
6-1/2	4	0	3	14	10	5	7	4
7-1/2	3	2	0	11	2	6	6	3
8 to 9-1/2	3	0	0	9	0	2	3	2
10-1/2	1	0	0	0	1	0	1	1
Totals	146	259	310	372	303	231	247	231

Table 15. Age composition of Martha's Vineyard, Massachusetts deer check at biological stations from 1971 through 1975.

	Males					Females				
Age	1971	1972	1973	1974	1975	1971	1972	1973	1974	1975
6 mos.	39	25	30	27	32	31	30	24	32	22
1-1/2	41	41	25	32	30	11	24	21	21	13
2-1/2	14	15	17	9	6	16	11	17	12	13
3-1/2	8	15	12	19	7	11	15	13	9	13
4-1/2	4	6	7	5	4	4	9	8	5	5
5-1/2	3	1	3	1	3	3	6	2	5	1
6-1/2	0	3	0	0	0	2	1	1	2	3
7-1/2	1	2	0	1	0	2	2	1	0	1
8 to 9-1/2	1	0	0	0	0	3	1	1	0	0
10-1/2	0	0	0	0	0	0	0	0	1	0
Totals	111	108	94	94	82	88	99	88	87	71

Table 16. Age composition of Nantucket, Massachusetts deer checked at biological stations from 1971 through 1975.

	Males					Females				
Age	1971	1972	1973	1974	1975	1971	1972	1973	1974	1975
6 mos.	27	17	22	25	27	14	21	21	20	26
1-1/2	38	19	28	31	28	22	16	17	21	23
2-1/2	13	12	19	15	14	12	12	8	10	7
3-1/2	7	12	11	12	11	13	5	7	1	6
4-1/2	4	0	4	2	4	2	5	9	6	6
5-1/2	0	3	2	1	0	3	0	2	2	1
6-1/2	0	0	1	0	0	0	1	0	1	2
7-1/2	1	0	0	0	0	0	1	1	0	1
8 to 9-1/2	0	0	0	0	0	0	0	0	0	0
10-1/2	0	0	0	0	5	0	0	0	0	2
Total	90	63	86	86	89	66	61	65	61	74

Table 17. A summary of the Massachusetts shotgun deer harvest, 1967 through 1975.

Year	All Males	Adult Males	Button Bucks	All Females	Adult Females	Fawn Females	Total Deer	Total Permits Issued	Button Bucks and Females	% of Total Deer
1967	937	886	53	235	168	67	1,172	2,430	288	25
1968	1,083	1,022	61	310	217	93	1,393	2,331	371	27
1969	1,424	1,299	125	586	415	171	2,010	5,295	711	35
1970	1,598	1,378	220	769	546	223	2,367	7,347	989	42
1971	1,359	1,106	253	889	643	246	2,248	7,270	1,142	51
1972	1,455	1,256	199	760	530	230	2,215	5,326	959	43
1973	1,421	1,258	163	616	444	172	2,037	5,386	779	38
1974	1,878	1,665	213	791	563	228	2,669	5,358	1,004	38
1975	1,691	1,492	199	700	478	222	2,391	5,370	899	38

Table 18. A summary of percentage change in adult harvest and calculated minimal populations of deer in Massachusetts, 1967 through 1975.

	1967	Percent Change 1976-1968	1968	Percent Change 1968-1969	1969	Percent Change 1969-1970	1970	Percent Change 1970-1971	1971
Adult male harvest	886	+ 15.35	1,022	+ 27.10	1,299	+ 6.08	1,378	- 19.73	1,106
Calculated adult male population	2,056	+ 17.05	2,410	+ 31.95	3,180	- 00.82	3,154	- 27.68	2,281
Calculated adult female population	2,018	+ 31.92	2,964	+ 35.19	4,007	+ 32.24	5,299	- 22.95	4,083
Calculated minimal populations	6,139	+ 42.37	8,740	+ 35.01	11,805	+ 27.18	15,014	- 22.93	11,571

	1971	Percent Change 1971-1972	1972	Percent Change 1972-1973	1973	Percent Change 1973-1974	1974	Percent Change 1974-1975	1975
Adult male harvest	1,106	+ 13.56	1,256	+ 00.02	1,258	+ 32.35	1,665	- 11.60	1,492
Calculated adult male population	2,281	+ 20.78	2,755	+ 11.80	3,080	+ 00.86	3,107	- 03.40	3,005
Calculated adult female population	4,083	- 3.67	3,933	- 02.11	3,850	+ 21.03	4,660	- 10.80	4,206
Calculated minimal population	11,571	- 2.03	11,336	+ 00.83	11,431	+ 13.59	12,984	- 08.00	11,975

Table 19. Summary of the adult male deer harvest per square mile of deer range per county in Massachusetts, 1970 through 1975. (Shotgun season)

County	Sq. Mi. Deer Range	1970	1971	1972	1973	1974	1975
Barnstable	267.3	.30	.30	.28	.28	.31	.27
Berkshire	811.8	.45	.43	.47	.53	.85	.74
Bristol	388.8	.01	.003	.003	.003	.01	.01
Essex	302.4	.07	.03	.06	.06	.05	.05
Franklin	621.0	.41	.38	.45	.34	.51	.44
Hampden	468.7	.25	.22	.28	.31	.35	.34
Hampshire	428.8	.26	.15	.23	.23	.27	.34
Middlesix	521.9	.02	.02	.01	.01	.003	.01
Norfolk	274.2	-	-	-	-	-	.004
Plymouth	473.0	.02	.01	.02	.01	.01	.03
Worcester	1,226.0	.16	.08	.10	.10	.11	.12
	5,783.9	.20	.16	.19	.19	.27	.25
Dukes*	87.4	.90	1.00	1.16	1.00	.84	.70
Nantucket	36.6	2.38	1.74	1.34	1.86	1.69	1.99

*Gosnold not included

Table 20. Summary of the adult female deer harvest per square mile of deer range per county in Massachusetts, 1970 through 1975. (Shotgun season)

County	Sq. Mi. Deer Range	1970	1971	1972	1973	1974	1975
Barnstable	267.3	.11	.10	.10	.06	.12	.04
Berkshire	811.8	.17	.24	.13	.13	.27	.20
Bristol	388.8	-	-	.003	.003	.003	0
Essex	302.4	.03	.003	.003	-	.01	.01
Franklin	621.6	.16	.28	.23	.13	.13	.14
Hampden	468.7	.07	.09	.08	.07	.07	.09
Hampshire	428.8	.11	.07	.08	.05	.07	.06
Middlesex	521.9	.01	.01	.01	.002	.002	.01
Norfolk	274.2	.004	-	-	-	-	.004
Plymouth	473.0	.01	.002	-	.004	.004	.02
Worcester	1,226.0	.08	.05	.03	.04	.04	.04
	5,783.9	.08	.09	.08	.05	.08	.07
Dukes*	87.4	.35	.69	.88	1.00	.67	.63
Nantucket	36.6	1.64	1.50	1.09	1.20	1.20	1.39

*Gosnold not included

Table 21. A summary of the total harvest of deer in Massachusetts (including shotgun, archery, and muzzle load harvests) per county per sex and the harvest of deer per square mile of deer range in Massachusetts for 1975.

County	Males	Females	Total	Sq. Mi. of Deer Range	Harvest: Total Deer per Sq. Mi.	Harvest: Males per Sq. Mi.	Harvest: Females per Sq. Mi.
Barnstable	75	16	91	267.3	.34	.28	.06
Berkshire	651	236	887	811.8	1.09	.80	.29
Bristol	5	--	5	388.8	--	.01	--
Essex	16	6	22	302.4	.07	.05	.02
Franklin	312	131	443	621.6	.71	.50	.21
Hampden	176	61	237	468.7	.51	.38	.13
Hampshire	155	37	192	428.8	.45	.36	.09
Middlesex	4	4	8	521.9	.02	.01	.01
Norfolk	1	1	2	274.2	.01	.004	.004
Plymouth	17	12	29	473.0	.06	.04	.03
Worcester	162	64	226	1,226.0	.18	.13	.05
Total	1,574	568	2,142	5,783.9	.37	.27	.10
Dukes *	95	80	175	87.4	2.00	1.08	.92
Nantucket	100	78	178	36.6	4.86	2.73	2.13
Total	1,769	726	2,495	5,907.9	.42	.30	.12

*Gosnold not included

Table 22. Percent Frequency Ratio of Adult Females to Adult Males, 1968 through 1974.

County	1968 Adult M.	1968 Adult F.	1968 % Freq.	1969 Adult M.	1969 Adult F.	1969 % Freq.	1970 Adult M.	1970 Adult F.	1970 % Freq.	1971 Adult M.	1971 Adult F.	1971 % Freq.
Barnstable	44	6	.14	58	16	.28	80	29	.36	82	25	.30
Berkshire	314	53	.17	371	100	.27	366	133	.38	352	187	.53
Bristol	5	1	.20	3	1	.33	4			1		
Essex	10	1	.10	13	4	.31	20	9	.45	12	1	.08
Franklin	230	68	.30	256	93	.36	251	93	.39	232	176	.76
Hampden	98	13	.13	123	32	.26	117	31	.26	103	42	.41
Hampshire	107	27	.25	115	47	.41	114	43	.42	63	31	.49
Middlesex	7	3	.43	13	4	.31	9	6	.67	14	7	.50
Norfolk				3				1				
Plymouth	8	3	.38	14	6	.43	8	4	.50	7	1	.14
Suffolk												
Worcester	75	28	.37	176	59	.34	192	83	.46	89	60	.67
Total	898	203	.23	1,145	362	.32	1,161	452	.39	955	530	.55
No. of Sportsmen Permits		2,000			4,000			6,000			6,000	
Dukes	56	9	.16	62	16	.26	79	31	.39	87	58	.67
No. of Sportsman Permits											600	
Nantucket	56	5	.09	68	35	.51	87	60	.69	64	55	.86
No. of Sportsman Permits					400			400			400	
Total Number of Permits*		2,331			4,695			6,747			7,270	

* Includes Farmer-Landowner Permits

Table 22 (Continued)

County	1972 Adult M.	1972 Adult F.	1972 % Freq.	1973 Adult M.	1973 Adult F.	1973 % Freq.	1974 Adult M.	1974 Adult F.	1974 % Freq.	1975 Adult M.	1975 Adult F.	1975 % Freq.
Barnstable	75	27	.36	77	15	.19	85	31	.36	72	11	.15
Berkshire	373	112	.30	424	109	.26	689	216	.31	601	163	.27
Bristol	3	1	.33				4	1	.25	5		
Essex	16	1	.06	16	4	.25	13	3	.23	14	4	.29
Franklin	277	141	.51	213	79	.37	316	76	.24	275	90	.33
Hampden	131	38	.29	145	36	.25	160	37	.23	161	42	.26
Hampshire	98	34	.35	101	22	.22	116	32	.28	146	25	.17
Middlesex	3	4	1.33	4	1	.25	2	1	.50	4	3	.75
Norfolk										1	1	1.00
Plymouth	12			5	2	.40	6	2	.33	16	8	.50
Suffolk												
Worcester	117	44	.38	119	51	.43	133	52	.39	144	44	.31
	1,105	402	.36	1,104	316	.29	1,524	451	.30	1,439	391	.27
No. of Sportsman Permits		4,000			4,000			4,000			4,200	
Dukes	102	77	.75	86	87	1.01	73	60	.82	61	55	.90
No. of Sportsman Permits		600			600			600			600	
Nantucket	49	40	.82	68	44	.69	64	44	.69	73	51	.70
No. of Sportsman Permits		400			400			400			400	
Total Number of Permits*		5,326			5,349			5,358			5,570	

* Includes Farmer-Landowner Permits

Table 23. A Summary of the Shotgun Deer Harvest per Deer Management Unit, the Number of Sportsman Antlerless Permits per Unit, the Square Miles of Deer Range, the Adult Harvest per Unit and the Percent Frequency Ratio of Adult Females to Adult Males for 1975.

Unit	No. of Sportsman Permits	Adult	Fawns	Adult	Fawns*	Total Deer Harvest	Sq. Mi. of Deer Range	Adult Male/ Sq. Mi.	Adult Female/ Sq. Mi.	Percent Frequency Adult Female to Adult Male
Barnstable	200	69	3	10	5	87	267.3	.26	.04	.15
Berkshire	1300	578	50	148	67	843	811.8	.71	.18	.26
Franklin	700	262	37	87	39	425	621.0	.42	.14	.33
Hampden	400	155	15	37	17	224	468.7	.33	.08	.24
Hampshire	300	133	9	23	10	175	428.8	.31	.05	.17
Worcester	700	133	18	39	18	208	1226.0	.11	.03	.29
Region I**	200	18	2	6	3	29	1098.5	.02	.01	.33
Region II***	200	21	1	8	4	34	861.8	.02	.01	.38
Dukes	600	54	34	53	24	165	87.4	.62	.61	.98
Nantucket	400	62	27	48	26	163	36.6	1.69	1.31	.77
Totals		1485	196	459	213	2353	5907.9	.25	.08	.31

* Female fawns were calculated using the percent of fawns reported at biological deer checking stations.
** Region I includes Essex, Middlesex and Norfolk Counties.
*** Region II includes Bristol and Plymouth Counties.

551. EA32.3:W-35-R-18/III-1

JOB PERFORMANCE REPORT

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State Massachusetts

Project No. W-35-R-18

Project Title Game Population Trend and Harvest Survey

Project Type: Research and Surveys

Period Covered: 1 June 1975 to 31 May 1976

Work Plan III Census of Game Species

Objectives: To determine trends in Massachusetts populations of mourning dove, bobwhite quail, and woodcock.

Job III-1 Mourning Dove Census

Objectives: To obtain an index of the spring breeding population of mourning doves.

Summary: Calling doves were counted on three randomized routes in cooperation with the U.S. Fish and Wildlife Service's annual mourning dove breeding population census. The total number of calling doves increased 11.5 times from 1974 to 1975 on two comparable routes. Data from one route was not retained and is unavailable for comparison.

Target Date: 31 May 1979.

Progress: On schedule.

Significant Deviations: None

Recommendations: Continue the spring mourning dove census in cooperation with the U.S. Fish and Wildlife Service.

Cost: $73.05 (Project leader man-days: 1/2)

Remarks: Procedures: In accordance with instructions from the U.S. Fish and Wildlife Service, doves were censused by roadside coo-count between 22 and 29 May on the three randomized routes established in 1967. Division personnel conducted two routes and a Fish and Wildlife Service cooperator conducted a third route.

Findings: Results of the 1975 call count of mourning doves are compared with previous years' data in Table 1.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Table 1. Doves heard on comparable Massachusetts routes: 1966 to 1975.

Route	Doves Heard										Percent 1975 Counts ± From								
	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1966	1967	1968	1969	1970	1971	1972	1973	1974
8	22	26	11	2	11	10	12	10	0	19	-14	-27	+73	+850	+73	+90	+58	+90	+1900
8A*	**	11	1	1	2	1	2	2	2	6	-	+500	+500	+500	+200	+500	+200	+200	+200
10	3	7	0	1	3	1	2	4	4	***	N/A								
Totals Less Route 10	22	27	12	3	13	11	14	12	2	25	+14	-7	+108	+733	+92	+127	+78	+108	+1150
Totals (All Routes)	25	34	12	4	16	12	16	16	6	25									
Mean	8.3	11.3	4.0	1.3	5.3	4.0	5.3	5.3	2.0	13.5									

* Route relocated 1974.
** Route not conducted.
*** Route conducted; data not retained.

The total number of calling doves on two routes combined increased 1150 percent over 1974 counts. Route 8 increased from none to 19 doves and Route 8A increased from two to six doves. Route 10 was conducted but data was not retained and is unavailable for this report.

The weighted mean number of doves heard per comparable Massachusetts route was 5.0 in 1974 and 9.9 in 1975 for an annual increase of 97.5 percent (Ruos 1975). Ruos also reports that dove breeding population indices in the Eastern Management Unit increased by 9.9 percent from 1974 to 1975, but are still 3.3 percent below the ten-year mean. Long-term trends also show a decline, with regression analyses showing a statistically significant downward trend in Eastern Unit population indices.

MASSACHUSETTS DIVISION OF FISHERIES & WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Arthur W. Neill, Superintendent

Prepared by: _____
James E. Cardoza
Game Biologist

Date _____

Literature Cited

Ruos, J. L. 1975. 1975 mourning dove breeding population status. U. S. Fish & Wildlife Service, Laurel, Md., Admin. Rept., 35 pp. mimeo.

(Job) PERFORMANCE REPORT

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STATE MASSACHUSETTS

Project No. W-35-R-18

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Inventory

Period Covered: 1 June 1975 to 31 May 1976

Work Plan III Census of Game Species

Objective: To determine trends in Massachusetts populations of mourning doves, bobwhite quail and woodcock.

Job III-2 Spring Quail Census

Job Objective: To determine the dynamic aspects of quail population densities and distribution.

Summary: The 1975 spring quail census showed a statistically significant decrease (t .05) from 1973 indices in Plymouth County, and from the combined 1958-1961 index for Barnstable and Plymouth counties. Bristol County experienced non-significant declines.

Target Date: 31 May 1979.

Progress: On schedule.

Significant Deviations: None

Recommendations: The roadside whistle count has been demonstrated to be an effective technique for monitoring trends in bobwhite quail populations (Bennitt 1951; Ripley 1956; Kabat and Thompson 1963). However, several conditions have recently limited the effectiveness of its application in Massachusetts. Firstly, the number of routes surveyed per county has varied considerably since the census inception in 1953. Ten or more routes per county were surveyed in the 1950's with as few as two to three comparable routes being surveyed in some counties between 1964 and 1971. Such scanty coverage cannot provide adequate sampling of a county and would only reflect extreme fluctuations in quail populations. Secondly, the routes surveyed have often been different from year to year, thus hampering comparison between survey years. Thirdly, outside disturbances have hindered data collection on some survey routes. Construction and increased highway traffic have eliminated quail habitat along census routes, or resulted in excessive noise which prevents hearing quail which are present. Calling activity is also affected by rain or wind, and if adverse weather conditions necessitate postponing a count, manpower limitations may preclude its subsequent rescheduling under more favorable conditions.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

If the spring whistle count is to be continued as an index to quail population trends, the following recommendations should be considered:

1. Increase the number of routes per county to a minimum of six in Barnstable and Plymouth counties. Bristol County, with a lesser area and populations, can probably remain at the present level of four routes.

2. Examine all routes for outside disturbances and relocate those which are unacceptable.

3. Once routes have been established, survey the same routes during each census period.

4. Consider conducting the census every third year instead of biennially.

Cost: $385.29 (Project Leader man-days: 4)

Remarks: Procedures: Roadside whistle counts were conducted during the first two weeks of July 1975 following established procedures and routes (W-25-R). The resultant call indices were corrected for temperature variations (Bennett 1951; Ripley 1956) and tabulated and analyzed on a county basis. Counts for all counties were compared with the previous year's indices and with a four-year (1958-1961) index. Changes in annual counts were analyzed for statistical significance with a one-sided t-test and the results reported accordingly by counties.

Findings: The 1975 weighted call indices as compared to those from 1973 and the four-year average are shown in Table 1. Computations of the tests of significance and comparisons of the indices by county and route are shown in Tables 2, 3, and 4.

The 1975 indices were lower than those from 1973 in all three counties. Changes were statistically significant (t .05) for Barnstable County as compared to the 1958-1961 index, and for Plymouth County compared both to the four-year index and to the 1973 call index. Non-significant declines were recorded in Bristol County.

Prior to 1975, only two statistically significant changes occurred in quail populations monitored by this census. Plymouth County suffered a significant (t .01) drop from

Table 1. County comparative call indices of Massachusetts quail populations, 1958-61 to 1975.

County	Average 1958-1961 Index	1964 Index	1967 Index	1969 Index	1971 Index	1973 Index	1975 Index	Significant Change (t .05) 1975 to 1958-61	1975 to 1973
Barnstable	2.65	1.55	1.90	3.31	4.51	2.38	1.38	Yes	No
Bristol	0.71	0.91	0.96	0.95	2.21	1.52	1.16	No	No
Plymouth	1.84	1.34	1.83	2.49	2.02	1.56	0.81	Yes	Yes

Table 2. Analysis of differences in call indices, Barnstable County, 1975 and 1973.

Route No.	Call Indices 1973	1975	D	$D-\bar{d}$	$(D-\bar{d})^2$
16B	266	120	146	45.25	2,047.56
18A	327	84	243	142.25	20,235.06
21	120	129	9	-91.75	8,418.06
23	240	217	23	-77.75	6,045.06
	953	550			36,745.74
	$\bar{x}$ = 238.25	$\bar{x}$ = 137.50			n-1 = 3

$\bar{d}$ = 100.75

$S\bar{d}$ = $\sqrt{3,062.14}$ = 55.34

$SD^2 = \frac{36,745.74}{3} = 12,248.58$

$t = \frac{100.75}{55.34} = 1.821$

$S\bar{d}^2 = \frac{12,248.53}{4} = 3,062.14$

t. 05 (3 d.f.) = 2.353

Table 2 (cont.). Analysis of differences in call indices, Barnstable County, 1975 and Four-Year Average (1953-61).

Route No.	Call Indices 1958-61	1975	D	$D-\bar{d}$	$(D-\bar{d})^2$
16B	207	120	87	-26	676
18A	289	84	205	92	8,464
21	235	129	106	- 7	49
23	271	217	54	-59	3,481
	1,002	550			12,670
	$\bar{x}$ = 250.50	$\bar{x}$ = 137.50			

$\bar{d}$ = 113.00

$S\bar{d}$ = $\sqrt{1,055.83}$ = 32.49

$SD^2 = \frac{12,670}{3} = 4,223.33$

$t = \frac{113.00}{32.49} = 3.478$

$S\bar{d}^2 = \frac{4223.33}{4} = 1,055.83$

t .05 (3 d.f.) = 2.353

t .01 (3 d.f.) = 4.541

Table 3. Analysis of differences in call indices, Bristol County, 1975 and 1973.

Route No.	Call Indices 1973	1975	D	$D-\bar{d}$	$(D-\bar{d})^2$
9A	107	275	168	132	17,424
15	200	53	147	111	12,321
35	180	43	137	101	10,201
36	120	92	28	- 8	64
	607	463			40,010
	$\bar{x}$ = 151.75	$\bar{x}$ = 115.75			n-1 = 3

$\bar{d}$ = 36.00 $\quad S\bar{d} = \sqrt{3,334.17} = 57.74$

$S_D^2 = \frac{40,010}{3} = 13,336.67$ $\quad t = \frac{36.00}{57.74} = 0.623$

$S_{\bar{d}}^2 = \frac{13,336.67}{4} = 3,334.17$ $\quad t$ .05 (3 d.f.) = 2.353

Table 3 (Cont.). Analysis of differences in call indices, Bristol County, 1975 and four-year average (1958-61).

Route No.	Call Indices 1958-61	1975	D	$D-\bar{d}$	$(D-\bar{d})^2$
9A	74	275	201	- 29.5	870.25
15	68	53	15	-215.5	46,440.25
35	No data available	-			
36	No data available	-			
	142	603			47,310.50
	$\bar{x}$ = 71.00	$\bar{x}$ = 301.50			n-1 = 1

$\bar{d}$ = 230.50 $\quad S\bar{d} = \sqrt{23,655.25} = 153.80$

$S_D^2 = \frac{47,310.50}{1} = 47,310.50$ $\quad t = \frac{230.50}{153.80} = 1.499$

$S_{\bar{d}}^2 = \frac{47,310.50}{2} = 23,655.25$ $\quad t$ .05 (1 d.f.) = 6.314

Table 4. Analysis of differences in call indices, Plymouth County, 1975 and 1973.

Route No.	Call Indices 1973	Call Indices 1975	D	D-$\bar{d}$	$(D-\bar{d})^2$
5	136	64	72	- 3	9
6A	154	31	123	48	2,304
12	200	153	47	-28	784
13A	133	75	58	-17	289
	623	323			3,386
	$\bar{x}$ = 155.75	$\bar{x}$ = 80.75			n-1=3

$\bar{d}$ = 75.00

$S\bar{d}$ = $\sqrt{282.17}$ = 16.80

$S_D^2 = \frac{3,386}{3}$ = 1,128.67

$t = \frac{75.00}{16.80}$ = 4.464

$S\bar{d}^2 = \frac{1,128.67}{4}$ = 282.17

t .05 (3 d.f.) = 2.353
t .01 (3 d.f.) = 4.543

Table 4. (Cont.) Analysis of differences in call indices, Plymouth County, 1975 and four-year average (1958-61).

Route No.	Call Indices 1958-61	Call Indices 1975	D	D-$\bar{d}$	$(D-\bar{d})^2$
5	115	64	51	-67.25	4,522.56
6A	115	31	84	-34.25	1,173.06
12	319	153	166	47.75	2,280.06
13A	247	75	172	53.75	2,889.06
	796	323			10,864.74
	$\bar{x}$ - 199.00	$\bar{x}$ = 80.75			n-1 = 3

$\bar{d}$ = 118.25

$S\bar{d}$ = $\sqrt{905.40}$ = 30.09

$S_D^2 = \frac{10,864.74}{3}$ = 3,621.58

$t = \frac{118.25}{30.09}$ = 3.930

$S\bar{d}^2 = \frac{3,621.58}{4}$ = 905.40

t .05 (3 d.f.) = 2.353
t .01 (3 d.f.) = 4.543

1960 to 1961--a decline attributed to an exceptionally severe winter from 1960-1961--and, in the same county, call indices increased significantly (t .05) from 1964-to 1967. No reason was then attributed to this increase.

Literature Cited: Bennitt, R. 1951. Some aspects of Missouri quail and quail hunting, 1933-1948. Mo. Cons. Comm., Tech. Bull. 2. 51 pp.

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Ripley, T. H. 1956. Annual whistle count census to determine relative population densities and distribution. Mass. Div. Fish & Game, Westboro. Project W-25-R-3, Job I-A. Supplement 1, Table D.

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MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Arthur W. Neill, Superintendent

Prepared by: _____
James E. Cardoza
Game Biologist

Date _____

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PERFORMANCE REPORT

State Massachusetts Project No. W-35-R-18

Project Title Game Population Trend and Harvest Survey

Project Type Research and Surveys

Period Covered: 1 June 1975 to 31 May 1976

Work Plan IV Wild Turkey Restoration Study

Plan Objectives: To re-establish the wild turkey in the Commonwealth in sufficient numbers to allow for recreational hunting.

Job IV-1 Experimental Turkey Stocking

Job Objectives: To re-establish the wild turkey in the Commonwealth in sufficient numbers to allow for recreational hunting.

Summary: Turkeys in the Beartown State Forest showed increased signs of dispersal from the release area. Reports were received from several towns south and west of Beartown. Reports of turkeys to the north may include dispersed birds from releases in New York and Vermont. Broods were produced in at least two locations on and adjacent to Beartown Forest.

Target Date: 31 May 1979

Status of Progress: On schedule.

Deviations: None

Recommendations: Continue evaluation of the Beartown release. Continue public information efforts designed to increase reporting of turkey sightings. Investigate potential release sites in western Massachusetts as to suitability for future releases of transplanted birds.

Cost: $4355.12 (project leader man days: 40-1/2)

Remarks: Procedures. Turkey abundance was indexed by roadside counts, track counts, and cooperator reports. Snowmobiles were used during the winter to provide access to the areas and to transport grain for baiting.

Findings: Beartown State Forest Area

A total of 37 wild-trapped turkeys (6 adult males, 9 adult females, 9 immature males, 7 immature females, 6 immature unknowns) from Allegany State Park, Cattaraugus County, New York, were released in Beartown State Forest, Great Barrington, Berkshire County, between March 1972 and September 1973.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Few reports were received during the first two years of the release, but in 1974-75 sightings increased with turkeys being reported at several locations on Beartown Forest and in towns peripheral to it. This trend continued in 1975-76 with reports being received from additional towns in southern Berkshire County and, in a few instances, from more northern towns.

Broods were reported from two locations in the Beartown area. Adult turkeys with poults were seen repeatedly in late July and August in a field east of Three-Mile Hill in Great Barrington. Possibly two broods were involved, with Division personnel and cooperators reporting from one to five adults and eight to 14 poults depending on the date and duration of the sighting. Cooperators reported 15-20 birds remaining in this area in early December. Another brood consisting of an adult and at least four poults was seen in midsummer by Forest personnel on the fire tower road in Beartown.

A large flock of turkeys was apparently frequenting the area between the old C.C.C. camp in Beartown and the Beartown Mountain road in Great Barrington and Tyringham. Contract loggers reported seeing about 25 turkeys near the crossing of East Brook in this area about mid-December, but this sighting could not be verified. Several other cooperators reported sightings and tracks of 9-12 turkeys near the C.C.C. camp in late December and January, and Division personnel observed tracks of seven turkeys on three occasions along Beartown Mountain road. These areas are close enough so that the same birds could be involved in both sightings.

Tracks of about 10 turkeys were located in early February near an overgrown pasture west of Three-Mile Hill, about 3.7 km (2.3 miles) west of Benedict Pond. Three adults had been seen in this area a week earlier by cooperators.

For the past two years, Division personnel have been receiving reports of turkeys along Cannon Hill in Lee and Tyringham. Scattered droppings and feathers have been found, confirming the presence of turkeys, but no track counts have yet been made. Cooperators reported 12-13 turkeys at a roadside corn crib on Main Road, Tyringham, in early March. The location of this presumed sighting does not conform to the expected behavior of wild-strain turkeys. Another cooperator, however, reliably reported seeing 12-13 turkeys crossing a woods road in Tyringham in late March about 2.4 km (1.5 miles) east of the above roadside sighting. Vague reports of an unstated number of turkeys had previously been received from this area.

To the south of Beartown, Western District personnel reported tracks of two turkeys near Lake Buel in Monterey in March 1975. Natural Resource officers reported tracks of seven turkeys at an unstated Monterey location in February 1976. Reports were again received of turkeys in

Tolland, with two turkeys (one bearded) reportedly seen in October 1975. Unconfirmed reports of single birds were received from Sandisfield and Sheffield.

Turkeys were also reported from West Stockbridge, northeast of Beartown, during both fall and spring. Two turkeys (supposedly one tom and one hen) were sighted on Maple Hill in November, while two sightings of single birds and one of three birds were reported by cooperators in April. Division personnel made one unsuccessful search for tracks in March.

Unconfirmed reports of turkeys were received from several towns north of Beartown. These include Richmond (one bird, April 1976); Dalton (three birds, September 1975); and Windsor (five birds, February 1976). Cooperators again reported turkeys off Balance Rock Road in Lanesboro. Three birds were reported picking insects in a mown field in early June 1975. These turkeys, and one seen in Hancock in July 1976, may represent stragglers from nearby New York releases.

A single turkey with a yellow patagial streamer was observed in Williamstown on two successive dates in March 1976. A single yellow-tagged bird was also seen in Adams near the Cheshire line on 1 May 1976 with a dubious sighting (due to the reported behavior of the turkey) near the Hoosic High School in Cheshire a week later. These yellow-tagged turkeys are probably stragglers from a release near Bennington and Pownal in Vermont in January and February 1976.

Statewide Populations

Turkeys on Prescott Peninsula in the Quabbin Reservation continue to improve in wildness. Their numbers, however, do not approach that attained while artificial feeding was being conducted. Cooperators reported a hen and nine or more poults near the antenna site and another with seven or more poults at Mt. Pleasant during the first week in June 1975. Division personnel attempted on three occasions to cannon-net turkeys on the peninsula. Equipment malfunction and the wariness and failure of the turkeys to appear stymied all attempts. Midwinter population on the peninsula was probably about 30 turkeys.

A few turkeys continue to be reported from the Montague area, and a hen was flushed from a nest of 15 eggs in Mt. Toby Forest in Sunderland on 3 May by foresters marking timber. The hen returned and was still brooding on 2 June.

No reports were received from the Barre or Douglas State Forest areas. One turkey was seen on Horse Mountain in Hatfield and five were reported in Granby near the Holyoke Range. These reports were not confirmed by Division personnel.

A single turkey was reported in south Middleboro in September 1975 by State Police. This was not confirmed, but if valid, represents the first sighting of Myles Standish Forest turkeys since the summer of 1971.

Cooperators reported a flock of three adult turkeys and five poults in Ashby State Forest in November 1975. Since Massachusetts has released no turkeys anywhere in this area, these may be wanderers from releases in New Hampshire.

Single birds or pairs were reported from Westfield and Spencer. Since there are no known populations in these areas, they may be misidentifications or escaped domestic turkeys.

The game-farm ancestry turkeys in October Mountain State Forest are apparently vanished or nearly so. A single bird was seen in this area during the current segment. No information was available as to whether this was a wild-strain or game-farm turkey. Five adult turkeys and one juvenile (game-farm ancestry) were reported being hand-fed in the Town of Mount Washington in October 1975.

Additional Activities: Project personnel met with foresters from the Division of Forests and Parks regarding the possibility of making wildlife clearings as a byproduct of contract logging operations. Indications were that this would be a possibility if no major additional effort was required. A few experimental clearings may be made on Beartown State Forest by Division personnel.

Division photographers produced one half-hour television special (shown twice) and one three-minute news spot. The project leader gave three slide talks and spoke on one radio program regarding the turkey study.

Acknowledgments: I extend my appreciation to personnel of the Division of Forests and Parks, Division of Law Enforcement, Metropolitan District Commission, and the University of Massachusetts for their cooperation and assistance.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by: _____
James E. Cardoza
Game Biologist

Date _____

MASS. EA 32.3: W-35-R-18/ 22-1

PERFORMANCE REPORT

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State Massachusetts Project No. W-35-R-18

Project Title Game Population Trend and Harvest Survey

Project Type Research and Surveys

Period Covered: 1 June 1975 to 31 May 1976

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Work Plan VI Black Bear Study

Plan Objectives: To define the range of the black bear in Massachusetts and to determine its population characteristics and rate of harvest by hunting.

Job VI-1 Black Bear Population Dynamics

Job Objective To define the range of the black bear in Massachusetts and to determine its population characteristics and rate of harvest by hunting.

Summary: Applications for bear hunting permits were received from 483 sportsmen. Three female bear were taken during the open season and two additional bear were illegally shot during deer week. Three cubs were illegally taken from the wild and later confiscated by the Division of Law Enforcement and turned over to a zoo. New reports of 41 observations totalling 52 bear were received from five counties. Two reports of problem bears were investigated.

Target Date 31 May 1979

Progress: On schedule

Deviations None

R Recommendations:

1. Continue evaluation of bear harvest through checking stations and periodic questionnaires.

2. Consider revising the season downward in 1977 if several females are again taken in 1976. If necessary, the season could most effectively be shortened by eliminating the one open Saturday in the season.

3. Continue determination of bear range and populations through recording of sightings.

4. Investigate nuisance complaints as necessary. Promote public-education programs to lessen man-bear conflicts.

5. Issue a news release prior to bear week urging hunters to spare cubs and, when identifiable, sows.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Cost $474.41 (project leader man days: 5)

Remarks:

Procedures. Current bear hunting regulations include mandatory reporting and tagging of bear. Bear checking stations were maintained daily during bear week at three locations: Birch Hill Wildlife Management Area, Baldwinville; Bitzer State Fish Hatchery, Montague; Western Wildlife District Headquarters, Pittsfield. When bear were presented for examination, station personnel affixed a metal game seal to the bear, removed a premolar tooth, and recorded the following information: town of kill, date killed, sex and weight of bear and method of kill.

The Information-Education Section issued periodic news releases asking for reports of bear. Several cooperating agencies reported sightings.

Findings: Bear hunting permit applications were received from 483 individuals during the 1975 season (Table 1) with three individuals succeeding in taking a bear. All three were reported as taken in Savoy, Berkshire County, on the last day of the six-day season. Two of the three were taken with the use of dogs. Two bears were examined by station personnel and determined to be females. They weighed 31.7 and 50.4 kg (85 and 150 lbs.) respectively. The third bear was checked as a pelt only (an illegal procedure) and reported by the hunter as also a female.

Two additional bears were shot illegally during the shotgun season for deer. One hunter claimed self-defense and voluntarily turned himself in; while the second bear was found dead in the woods and reported to Division personnel. Both bears were frozen for future examination by a cooperating university. The smaller, apparently a female, weighed 60.0 kg (150 lbs.) ungutted, and was shot in Colrain, Franklin County. The second, apparently a male, weighed 98.8 kg (265 lbs) ungutted, and was shot in Heath, Franklin County.

Three bears were also lost to the wild due to the illegal disturbance and taking of cubs from dens. In Chesterfield, Hampshire County, on 21 February, a local resident claiming to be looking for porcupine dens flushed a sow from a den containing two approximately four-week-old cubs (two males). Natural Resource officers investigated later that day. The sow had not returned by nightfall and the officers removed the cubs and brought them to the Springfield Children's Zoo. One cub was subsequently operated on successfully for an obstructed urethra. Both were left in captivity at the Children's Zoo. In the second incident, a single cub was confiscated from an individual who apparently obtained it from the wild in northern Berkshire County. It also was turned over to the Children's Zoo.

Table 1. Number of Bear Permit Applications and Number of Bear Taken in Massachusetts from 1970 to 1975.

Year	No. Permits	No. Bear Taken	Other Mortalities
1970	214	-	1 illegal kill; 1 road kill
1971	200	-	
1972	423	1	1 illegal kill
1973	309	-	1 road kill; 1 captured bear
1974	390	2	1 road kill
1975	483	3	2 illegal kills; 3 captured bear

Table 2. Reports of Black Bear by County for Massachusetts, 1952 to May 1976

County	1952-May 1975	June 1975-May 1976	Total	Percent
Berkshire	138	24	162	35.7
Franklin	160	7	167	36.8
Hampden	21	3	24	5.3
Hampshire	72	6	78	17.2
Middlesex	1	0	1	0.2
Worcester	21	1	22	4.8
	413	41	454	100.0

New reports of bear received during this segment included 34 sightings, three hunter kills, two illegal kills and two reports of captured bear, for a total of 52 bear reported in 26 towns. Reports by county for the period 1952 to May 1976 are presented in Table 2.

Three groups of a sow and two cubs were reported--one from Franklin County and two from Hampshire County.

Two problem situations were investigated. The first, in June 1975, involved depredation on beehives. The complaint ceased when the bears stopped coming to the hive area. The second complaint, in Chesterfield, Hampshire County, in September 1975, concerned damage to field corn. After investigation, Western District personnel installed a propane exploder in the field. No damage occurred thereafter.

The project leader gave two slide talks and spoke on one radio program concerning the bear study. He also attended the Third Eastern Bear Workshop at Hershey, Pennsylvania.

Acknowledgments: Personnel of the University of Massachusetts and the Division of Law Enforcement assisted by reporting bear sightings. Officers Edwin Lawler and Thomas Ricardi were particularly cooperative in investigating reports of captured bears. Personnel of the Springfield Children's Zoo willingly accepted and cared for three confiscated cubs.

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Job VI-2 Historical Records of the Black Bear in Massachusetts

Job Objective: To determine trends in black bear populations and distribution from preColonial times to the present.

Remarks: The final report on this job has been completed and will be submitted separately. Preparations are underway to publish it as a Division research bulletin.

Cost: $1835.18 (project leader man days: 37-1/2)

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by _____
James E. Cardoza
Game Biologist

Date _____

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PERFORMANCE REPORT

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State Massachusetts Project No. W-35-R-19

Project Title Game Population Trend and Harvest Survey

Project Type Research and Surveys

Period Covered 1 June 1976 to 30 May 1977

Work Plan I Statewide Game Harvest

Work Plan Objectives: To determine the statewide harvest of selected small game and furbearer species and to present recommendations, based upon management practices and regulations, to increase the utilization of certain species.

Job I-1 Statewide Small Game Harvest

Objectives: To determine the statewide harvest of selected small game and furbearer species and to determine the time expenditure by sportsmen.

Summary: A sample of 400 small game hunters (consisting of two subsamples of 200) was surveyed by telephone in order to determine their harvest and participation in small game hunting. Additional special questions concerned waterfowl, squirrel, raccoon, deer, and mourning dove hunting.

Sampled totals were expanded to provide an index, by species of total hunters, total successful hunters, and total harvest Due to characteristics of the sampling procedure, estimated totals may not accurately reflect actual totals, however, useful trend indices can be developed which will be valuable in assessing harvests and hunter preferences.

Hunter effort in 1976, as in 1975, was greatest for pheasant, ruffed grouse, cottontail rabbit, woodcock, and ducks. Hunter success was greatest for pheasant, cottontail rabbit, ducks, ruffed grouse, and woodcock. The rankings were similar to 1975 except for woodcock which replaced gray squirrel in fifth place. Estimated harvests were greatest for ducks, cottontail rabbit, pheasant, raccoon, and gray squirrel. This was similar to 1975 except for pheasant and raccoon, which switched rankings.

The estimated number of Massachusetts deer hunters was calculated as 69,390 $\pm$ 4.2 percent. Shotgun hunters ranked first (97.6%), followed by archery (11.7%) and primitive firearm hunters (7.0%). The estimated number of permit

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

applicants (6,503) was significantly greater than the actual total (5,343). The sampled estimate of the deer harvest (3,664) also significantly exceeded the actual harvest (2,712).

The majority (80.3%) of the waterfowl hunters approved of the state duck stamp and preferred a noon Wednesday opening (53.5%) over the traditional opening day (38.9%).

Almost one-third (31.1%) of squirrel hunters participated in the early (September) squirrel season. Those squirrel hunters expressing an opinion disagreed (48.5% vs. 35.6%) with retaining the ban on rifles for squirrel hunting. Most hunters (87%) were satisfied with the zoned season, but were almost equally split in preferring a September opening over October.

Most raccoon hunters (71.4%) used dogs. A slight majority (59.8%) of all survey respondents indicated no interest in mourning dove hunting.

W-35-R-19:I-1

Target Date: 31 May 1979

Progress On Schedule

Deviations None

Recommendations
(1) Continue the small game harvest survey in 1977-78.
(2) Continue liaison with cooperators to refine sampling and analysis of the survey.

Cost: $2,750.09 (project leader man-days 7 1/2)

Remarks

Procedures: A sample of 400 small game hunters, consisting of two subsamples of 200 each, was used for the 1976-77 telephone survey. This was a refinement from 1975-76 when the sample consisted of 400 hunters (including deer hunters).

The sample was drawn from the calendar 1976 license sales of resident hunting and sporting licenses. Each county was represented in the sample by a percentage equal to the percentage of the combined license sales for that county. For example, if Worcester County had 40 percent of the licenses sold, then 40 percent of the sample was from Worcester County. Towns to be sampled in each county were determined by listing each town in alphabetical order and numbering sequentially commencing with one. Town numbers were then extracted from a book of random numbers separately for each county. Selected pages were read continuously until the requisite number of town selections had been obtained. Individual towns could be and were frequently selected more than once. Twice as many numbers as required were drawn to allow for negative contacts.

License stub cards were filed by town in several filing cabinets. There was no standard sequence to the cards within the town. Individual stubs were selected by drawing a random number and measuring in the requisite number of inches or millimeters (depending on the thickness of the pile). The first legible resident hunting or sporting license at or after that point was the card selected .

The survey was conducted using a statewide WATS line. Calls were made between 4:30 and 9:00 P.M.

Response data were transferred to IBM cards and totalled by computer by a cooperator at the University of Massachusetts.

Findings: In the first subsample, 269 hunters were contacted in order to reach 200 small game hunters. Thirty-two (32) persons did not hunt and 37 hunted only deer. In the second subsample, 301 individuals were contacted in order to yield 200 small game hunters. There were 41 non-hunters and 60 who hunted only deer.

Responses were initially tabulated separately for each species. The numbers of hunters seeking and the numbers of hunters successful by species for the two subsamples and the expanded estimates are presented in Tables 1 and 2.

The subsamples were drawn from license stubs filed by calendar year. However, license sales totals for the year sampled (1976) had not been tabulated on a calendar year basis. Therefore, the mean combined sales of resident hunting and sporting licenses for the last two years (1970 and 1971) for which calendar year totals were available were used as an approximation of 1976 sales. This mean license sale figure was used in the expansion of the data.

Approximately 11.85 percent (32 of 269) of the hunters in the first subsample bought a license, but did not hunt. In the second subsample, this percentage was approximately 13.62 and in the combined sample was 12.76. For each subsample and for the combined sample, the approximate 1976 hunting and sporting license sales total was reduced by the respective percentage to obtain an estimate of the total statewide population of hunters.

For each subsample, the number of hunters reported seeking each species was expressed as a percentage of the total number of hunters in that sample. This percentage was then multiplied by the estimated total hunter population as derived for that sample to obtain an expanded number of hunters seeking each species.

A successful hunter was defined as a hunter who took at least one individual of the spe cies he sought. Hunters seeking more than one species were regarded as successful or unsuccessful separately for each species hunted. The sampled number of successful hunters was then tabulated by species and expressed as a percentage of the total sampled number of hunters seeking in each subsample. Then, for each subsample, the expanded number of hunters seeking each species was reduced by the respective percentage to yield an expanded number of successful hunters.

Sampling was conducted so as to select 200 small game hunters in each subsample. However, if hunters seeking more than one species were treated separately for each species, there were 641 "hunters" seeking small game in the first subsample and 626 in the second subsample. This difference is not significant ($x^2 = 0.355$, $t.01=6.635$). There was no significant difference in the number of hunters seeking individual species, except for gray squirrel ($x^2 = 4.968$, $t.05=6.635$) and bobcat (no bobcat hunters in one subsample).

Table 1. Number of Hunters Seeking, Number of Successful Hunters, and Mean Take Per Hunter for First Sample of 200 Sportsmen.

Species	No. Hunters Seeking in Sample	Percent of Sample	Expanded No. Hunters Seeking*	No. Successful Hunters in Sample	Percent Successful of Sample Seeking	Expanded Number Successful Hunters	Mean Take Per Hunter
Ruffed Grouse	89	37.6	38,429	36	40.4	15,525	1.21
Pheasant	155	65.4	66,843	90	58.1	38,836	1.81
Quail	29	12.2	12,469	12	41.4	5,162	1.41
Woodcock	61	25.7	26,267	34	55.7	14,631	1.87
Canada Goose	32	13.5	13,798	12	37.5	5,174	1.16
Ducks	61	25.7	26,267	51	83.6	21,959	7.51
Opossum	3	1.3	1,329	3	100.0	1,329	2.00
Cottontail Rabbit	97	40.9	41,802	62	63.9	26,711	3.30
Snowshoe Hare	33	13.9	14,207	19	57.6	8,183	1.88
Gray Squirrel	54	22.8	23,303	36	66.7	15,543	4.07
Raccoon	20	8.4	8,585	17	85.0	7,297	10.45
Fox	7	3.0	3,066	2	28.6	877	0.43
Bobcat	0	0.0	0	0	0.0	0	0.00
Total	200(641)			154 (374)			
Other Only	37	15.6					

* 11.85% of hunters sampled did not hunt, so expansion based on 102,206

Table 2. Number of Hunters Seeking, Number of Successful Hunters, and Mean Take Per Hunter, by Species, for Second Sample of 200 Sportsmen.

Species	No. Hunters Seeking in Sample	Percent of Sample	Expanded No.Hunters Seeking*	No.Successful Hunters in Sample	Percent Successful of Sample Seeking	Expanded Number Successful Hunters	Mean Take Per Hunter
Ruffed Grouse	92	35.4	35,454	40	43.5	15,422	0.89
Pheasant	151	58.1	58,189	86	57.0	33,168	1.55
Quail	25	9.6	9,615	12	48.0	4,615	2.96
Woodcock	71	27.3	27,342	40	56.3	15,394	2.10
Canada Goose	40	15.4	15,424	17	42.5	6,555	1.18
Ducks	70	26.9	26,941	51	72.8	19,613	7.11
Opossum	4	1.5	1,502	1	25.0	376	0.25
Cottontail Rabbit	84	32.3	32,350	60	71.4	23,098	4.15
Snowshoe Hare	27	10.4	10,416	12	44.4	4,625	1.78
Gray Squirrel	39	15.0	15,023	29	74.4	11,177	4.21
Raccoon	15	5.8	5,809	14	93.3	5,420	19.00
Fox	7	2.7	2,704	4	57.1	1,544	1.14
Bobcat	1	0.4	401	0	0.0	0	0.00
Total	200(626)			152(366)			
Other Only	60	23.1					

* 13.62% of hunters sampled did not hunt, so expansion based on 100,154

There were 154 hunters in the first subsample and 152 in the second who were successful in taking at least one unit of game of any small game species. This difference is not statistically significant. The numbers of successful hunters taking individual species were not statistically significant for any sampled small game species. Bobcat hunters could not be tested since no sampled hunters were successful.

The reported, mean, and expanded bag take for both subsamples is presented in Table 3. The expanded bag take per species was derived by multiplying the annual mean take per successful hunter times the expanded number of successful hunters.

There was a statistically significant difference (x^2 = 6.310, t.05 = 3.841) in total reported take between the first and second subsamples. This difference was reflected in the takes of ruffed grouse, quail, woodcock, opossum, gray squirrel and raccoon (all different at the 99% level) and pheasant, cottontail rabbit, and fox (different at the 95% level).

The differences in the opossum and fox take can be explained by the small sample size. No reason is assigned for the differences in the taxes of other species.

Expanded hunter numbers and bag take for the Combined Sample of 400 small game hunters are presented in Table 4. Furbearer harvest data for the 1976-77 season shows pelt returns from licensed fur buyers of 8,053 raccoon and 707 fox (red and gray) as compared to an estimated take (from the telephone survey) of 100,534 raccoon and 2,236 fox. The estimated 1976 Massachusetts waterfowl harvest, as calculated by the U.S. Fish and Wildlife Service from wing collection surveys, was 95,870$\pm$ 3% ducks and 8,561$\pm$ 2% Canada geese. This compares to an estimated harvest (from the telephone survey) of 194,314 ducks and 17, 116 Canada geese. Inflated harvest figures probably resulting from the sampling of individual sportsmen who take unusually high numbers of particular species.

The calculated number of waterfowl hunters (ducks and geese combined, 41,320) is significantly different (99% level) from both the 1976 sales of Federal waterfowl stamps in Massachusetts (22,292 less 2.67% to non-hunters) and the 1976 sales of Massachusetts waterfowl stamps(27,961).

The sampled numbers of hunters seeking, numbers of successful hunters, total reported take, and mean take per successful hunter for the 1975 and 1976 surveys are presented in Table 5. Statistical comparison for these years is precluded due to the difference in Sample size between 1975 (338) and 1976 (400).

Table 3. Reported, Mean, and Expanded Bag Take for Two Samples of 200 Massachusetts Sportsmen

Species	First Sample			Second Sample		
	Reported Take	Annual Mean Take Per Successful Hunter	Expanded Take	Reported Take	Mean Take Per Successful Hunter	Expanded Take
Ruffed Grouse	108	3.00	46,575	82	2.05	31,615
Pheasant	273	3.03	117,673	234	2.72	90,217
Quail	41	3.42	17,654	74	6.17	28,474
Woodcock	114	3.35	45,063	149	3.72	57,266
Canada Goose	37	3.08	15,936	47	2.76	18,092
Ducks	457	8.96	196,753	498	9.76	191,423
Opossum	6	2.00	2,658	1	1.00	376
Cottontail Rabbit	308	4.97	132,754	349	5.82	134,430
Snowshoe Hare	62	3.26	26,677	48	4.00	18,500
Gray Squirrel	212	5.89	91,548	164	5.66	63,262
Raccoon	209	12.29	89,680	285	20.36	110,351
Fox	3	1.50	1,316	8	2.00	3,088
Bobcat	0	0.00	0	0	0.00	0
	1,830	11.9		1,939	12.8	

Table 4. Basic and Expanded Hunter Numbers and Bag Take for a Sample of 400 Massachusetts Sportsmen

Species	Number Hunters in Sample	Percent of Sample	Expanded Number Hunters Seeking*	Number Successful Hunters in Sample	Percent Successful of Sample Seeking	Expanded Number Successful Hunters	Reported Take (Range)	Mean Take Per Hunter	Mean Take per Successful Hunter	Expanded Take
Ruffed Grouse	181	36.42	36,839	76	41.99	15,469	190 (1-12)	1.05	2.50	38,672
Pheasant	306	61.57	62,279	176	57.52	35,823	507 (1-12)	1.68	2.88	103,170
Quail	54	10.86	10,985	24	44.44	4,882	115 (1-25)	2.13	4.79	23,385
Woodcock	132	26.56	26,866	74	56.06	15,061	263 (1-15)	1.99	3.55	53,466
Canada Goose	72	14.49	14,657	29	40.27	5,902	84 (1-9)	1.17	2.90	17,116
Ducks	131	26.36	26,663	102	77.86	20,760	955 (1-100)	7.30	9.36	194,314
Opossum	7	1.41	1,426	4	57.14	815	7 (1-4)	1.00	1.75	1,426
Cottontail Rabbit	181	36.42	36,839	122	67.40	24,829	657 (1-30)	3.70	5.38	133,580
Snowshoe Hare	60	12.07	12,209	31	51.67	6,308	110 (1-24)	1.83	3.55	22,393
Gray Squirrel	93	18.71	18,925	65	69.89	13,227	376 (1-25)	4.13	5.78	76,452
Raccoon	35	7.04	7,121	31	88.57	6,307	494 (1-60)	14.11	15.94	100,534
Fox	14	2.82	2,852	6	42.86	1,222	11 (1-5)	0.79	1.83	2,236
Bobcat	1	0.20	202	0	0.00	0	0	0.00	0.00	0
Other Only	97	19.52								

*12.76% of the hunters sampled did not hunt, so expansion based on 101,151 hunters.

Table 5. Sampled Number of Hunters Seeking, Numbers of Successful Hunters, Total Reported Take, and Mean Take Per Successful Hunters for 1975 (338) and 1976 (400) Surveys.

Species	Number Hunters Seeking		Number Successful Hunters		Total Reported Take		Mean Take Per Successful Hunter	
	1975	1976	1975	1976	1975	1976	1975	1976
Ruffed Grouse	184	181	76	76	202	190	2.66	2.50
Pheasant	257	306	153	176	349	507	2.28	2.88
Quail	63	54	37	24	189	115	5.11	4.79
Woodcock	111	132	58	74	258	263	4.45	3.55
Canada Goose	56	72	19	29	83	84	4.37	2.90
Ducks	108	131	81	102	890	955	10.99	9.36
Opossum	4	7	3	4	9	7	3.00	1.75
Cottontail Rabbit	145	181	104	122	506	657	4.86	5.38
Snowshoe Hare	44	60	22	31	61	110	2.77	3.55
Gray Squirrel	76	93	60	65	310	376	5.17	5.78
Raccoon	33	35	28	31	363	494	12.96	15.94
Fox	7	14	2	6	2	11	1.00	1.83
Bobcat	4	1	1	0	1	0	1.00	0.00

The 13 small game animals sampled in 1976 were ranked by hunter effort, hunter success, and abundance in the bag and compared with results of the 1975 survey (Table 6).

The top five species by hunter effort in the 1976 survey (Combined Sample) were pheasant, ruffed grouse, cottontail rabbit, woodcock and ducks (ranked in decreasing order, grouse and rabbit had equal estimated numbers of hunters seeking). The remaining eight animals had less than 10 percent of the hunter effort each. The top six species remained unchanged in ranking from 1975. Among the remainder, the greatest changes were for Canada goose (eighth to sixth place) and snowshoe hare (ninth to seventh place).

The top six animals in hunter success in 1976 were pheasant, cottontail rabbit, ducks, ruffed grouse, woodcock and gray squirrel, with the remaining seven having less than 10,000 successful hunters each. These rankings were unchanged from 1975 except for woodcock and gray squirrel which switched rankings by a margin of 1,834 hunters. (The greatest changes in the remaining groups were quail (seventh to tenth ranking) and snowshoe hare (ninth to seventh).

The species with the greatest estimated harvest (combined sample) were ducks, cottontail rabbit, pheasant, raccoon, gray squirrel, and woodcock. Harvests of remaining species were estimated at less than 50,000 units each. No species differed more than one ranking from 1975.

One special question asked if the respondent hunted deer in Massachusetts in 1976. There were 164 (69.2%) affirmative in the first subsample (237), and 177, (68.1%) in the second (260). These percentages were multiplied by the estimated statewide population of hunters for that sample in order to derive an estimated number of deer hunters in the state. The same procedure was followed for the Combined Sample (497), which had 341 (68.6%) deer hunters (Table 7).

The estimate from subsample one was 70,726 deer hunters; from subsample two 68,205; and from the combined sample 69,390^{+}, 2,914 hunters. This is an increase of about 4.06 percent of the 1975 estimate of 66,684.

Another question surveyed hunter par ticipation in the various types of deer seasons. Respondents were categorized in six seasons and combinations of seasons and expanded for each sample to an estimated number of hunters for each category of season (Table 8). As expected, the greatest number of sportsmen hunted the shotgun season only, followed by the shotgun-archery combination, the shotgun-primitive combination, equal numbers in the archery only and "all" seasons, and the least numbers in the primitive only season.

Table 6. Ranking of 13 Small Game Animals as to Hunter Effort, Hunter Success, and Harvest for Two Surveys of Massachusetts Sportsmen

Hunter Effort (number of Hunters Seeking)			Hunter Success (No. Successful Hunters)			Harvest (Expanded Take)		
Rank 1975	Rank 1976	Species	Rank 1975	Rank 1976	Species	Rank 1975	Rank 1976	Species
1	1	Pheasant	1	1	Pheasant	1	1	Ducks
2	2	Ruffed Grouse	2	2	Cottontail Rabbit	2	2	Cottontail Rabbi
3	2	Cottontail Rabbit	3	3	Ducks	4	3	Pheasant
4	3	Woodcock	4	4	Ruffed Grouse	3	4	Raccoon
5	4	Ducks	6	5	Woodcock	5	5	Gray Squirrel
6	5	Gray Squirrel	5	6	Gray Squirrel	6	6	Woodcock
8	6	Canada Goose	9	7	Snowshoe Hare	7	7	Ruffed Grouse
9	7	Snowshoe Hare	8	8	Raccoon	8	8	Quail
7	8	Quail	10	9	Canada Goose	10	9	Snowshoe Hare
10	9	Raccoon	7	10	Quail	9	10	Canada Goose
11	10	Fox	12	11	Fox	12	11	Fox
12	11	Opossum	11	12	Opossum	11	12	Opossum
12	12	Bobcat	13	13	Bobcat	13	13	Bobcat

Table 7. The Estimated Number of Deer Hunters in Massachusetts in 1976.

Sample Size	No. Hunters in Sample	Percent	Estimated No.Hunters	Range (95% C.L.)*
(1) 237	164	69.2	70,726	66,482-74,970
(2) 260	177	68.1	68,205	64,249-72,161
(T) 497	341	68.6	69,390	66,476-72,304

* (1) = ± 6.0% (2) = ±5.8% (T) = 4.2%

Table 8. The Estimated Number of Deer Hunters Participating in Archery, Primitive Firearm and Shotgun Deer Seasons in 1976.

	First Sample			Second Sample			Combined Sample		
Season Type	Number Hunters in Sample	Percent	Estimated Number Hunters	Number Hunters in Sample	Percent	Estimated Number Hunters	Number Hunters in Sample	Percent	Estimated Number Hunters
Archery	1	0.6	424	4	2.2	1,501	5	1.5	1,041
Primitive	3	1.8	1,273	0	0.0	0	3	0.8	555
Shotgun	138	84.2	59,551	144	81.4	55,519	282	82.7	57,386
Shotgun-Archery	10	6.1	4,314	20	11.3	7,707	30	8.8	6,106
Shotgun-Primitive	10	6.1	4,314	6	3.4	2,319	16	4.7	3,261
All	2	1.2	849	3	1.7	1,159	5	1.5	1,041
Totals	164	100.0	70,726	177	100.0	68,205	341	100.0	69,390
All Archery	13	7.9	5,587	27	15.2	10,367	40	11.7	8,119
All Primitive	15	9.1	6,436	9	5.1	3,478	24	7.0	4,857
All Shotgun	160	97.6	69,028	173	97.7	66,636	333	97.6	67,725

Respondents were then regrouped into three participation categories: archery, primitive, and shotgun hunters, and then expanded accordingly for each sample. The combined total yielded an estimate of 67,725 persons hunting in the shotgun season; 8,119 in the archery season; and, 4,857 in the primitive firearm season. The calculated number of archery hunters is significantly different (x^2= 66.38, t.01 = 6.635) from the 1976 sales of archery stamps (7,402). This can be par tially explained by: (1) the sample was drawn from calendar 1976 license sales but the archery stamp sales were tabulated from fiscal 1976 sales; (2) there is no estimate of how many hunters bought stamps but were later unable to hunt; (3) there is no estimate of how many stamps were bought by collectors.

Respondents indicating that they did hunt deer in Massachusetts in 1976 were further asked whether or not they applied for an antlerless deer permit and if they did apply, whether or not they were successful. Responses are listed in Table 9. The Combined Sample estimate of the number of applicants was 39,894 (37,748 - 42,262 in subsamples). This exceeds the actual number of applicants (34,000). No reasons are assigned for the difference The expanded number of successful applicants in the Combined Sample (6,503) was also significantly greater (x^2 = 229.38, t.01 = 6.635) than the actual number of 5,343 applicants.

Respondents indicating that they hunted deer were also aske whether or not they were successful in bagging a deer. There were 12 of 164 (7.32%) affirmative in the first sample; 6 of 177 (3.39%) in the second, and 18 of 341 (5.28 in the combined sample. These percentages were multiplied by the estimated total number of deer hunters as calculated for each sample in order to derive an estimated deer harvest for the 1976 season (Table 10). The estimate from subsample one was 5,177 deer; from subsample two, 2,312 and from the combined sample, 3,664. This total is significantly greater (x^2= 290.76, t.01 = 6.635) than the number of deer (2,712) reported at state checking stations.

Another special question asked duck hunters if they approved of the state duck stamp. The stamp was generally favored with 49 of 61 (80.3%) in the first subsample; 54 of 70 (77.1%) in the second, and 103 of 131 (78.6%) in the combined sample registering approval.

Another waterfowl question asked hunters if they preferred a noon Wednesday opening with five bonus days, or a traditional half-hour before sunrise opening with no bonus. The first subsample responded as follows: Wednesday (37, 60.7%); traditional (19, 31.1%); no opinion (5, 8.2%).

Table 9. Sampled and Expanded Numbers of Antlerless Deer Permit Applicants and Successful Applicants for a Combined Sample of 497 Massachusetts Hunters.

Sample (Amount) (No. Deer Hunters)	Number of Permit Applicants	Percent	Expanded Number of Applicants	Number of Successful Applicants	Percent	Expanded Number of Successful Applicants
Sample 1 (237) (164)	98	41.35	42,262	20	20.4	8,621
Sample 2 (260) (177)	98	37.69	37,748	12	12.2	4,605
Combined (497) (341)	196	39.44	39,894	32	16.3	6,503

Table 10. The Estimated Deer Harvest in Massachusetts in 1976.

	No. Deer Hunters in Sample	No. Successful Hunters in Sample	Percent	Estimated Number Deer Hunters	Estimated Number Successful Hunters	Range * (95% C.L.)
(1)	164	12	7.32	70,726	5,177	4,966 - 5,388
(2)	177	6	3.39	68,205	2,312	2,249 - 2,375
(T)	341	18	5.28	69,390	3,664	3,575 - 3,753

* (1) = $\pm$ 4.07% (2) = $\pm$ 2.72% (T) = $\pm$ 2.42%

The second group showed a greater difference of opinion with 33 (47.2%) preferring the noon Wednesday choice, 32 (45.7%) preferring the traditional opening and 5 (7.1%) having no opinion. For the combined sample, over half (70, 53.5%) chose the noon Wednesday option with 51 (38.9%) opting for the traditional opening and 10 (7.6%) having no opinion.

Squirrel hunters were asked if they hunted in the early season (13 September to 19 October) in western Massachusetts and/or in the remainder of the season (after 20 October). In the first subsample, 10 of 54 (18.5%) hunted in the early season, 31 (57.4%) in the later season and 10 (18.5%) in both portions, with three hunters (5.6%) not responding. In the second subsample, four (10.3%) hunted the early season, 25 (64.1%) the later season, five (12.8%) both, and five (12.8%) failed to respond. The combined sample showed that almost one-third (29, 31.1%) of squirrel hunters took advantage of the recently instituted early season, with 56 (60.2%) hunting only in the later season, and eight (8.6%) not indicating their preference.

Raccoon hunters were asked their method of hunting. Thirteen of 20 (65%) in the first subsample, 12 of 15 (80%) in the second, and 25 of 35 (71.4%) in the combined sample used hunting dogs. The remaining hunters took raccoons incidentally to other species (8 of 35), used night lighting (1 of 35), or used a combination of methods (1 of 35).

All small game hunters were asked two questions pertaining to squirrel hunting. The first question concerned their opinion of the statement, "The ban on rifles for squirrel hunting should be continued." In the first subsample, 107 (45.1%) disagreed and in the second subsample, 134 (51.5%) disagreed. For the combined sample, 14 (2.8%) strongly disagreed, 227 (45.7%) disagreed, 79 (15.9%) were uncertain 163 (32.8%) agreed and 14 (2.8%) strongly agreed.

Hunters were also asked if they preferred a September or October date opening date for the squirrel season and whether or not they were satisfied with the present zoned season. Results are presented in Table 11. Of those expressing an opinion, slightly more (158, 31.8%) preferred an October opening than the September opening (145, 29.2%). Most of the respondents expressing an opinion were satisfied with the current zoned season (269 of 309, 87%).

A final spe cial question asked all contacts if they would hunt mourning doves if there was an open season on that species. The majority stated that they would not with

Table 11. Hunter Preferences for Opening Dates and Zoning of the Squirrel Season for Two Samples of Massachusetts Small Game Hunters

	SUBSAMPLE 1			SUBSAMPLE 2			COMBINED SAMPLE		
Question	Sept.	Oct.	No Opinion	Sept.	Oct.	No Opinion	Sept.	Oct.	No Opinion
Preference for Opening Date	69 (29.1%)	72 (30.4%)	96 (40.5%)	76 (29.2%)	86 (33.1%)	98 (37.7%)	145 (29.2%)	158 (31.8%)	194 (39.0%)
Satisfaction with Zoning	YES 123 (51.9%)	NO 17 (7.2%)	NO OPINION 97 (40.9%)	YES 146 (56.2%)	NO 23 (8.8%)	NO OPINION 91 (35.0%)	YES 269 (54.%)	NO 40 (8%)	NO OPINION 189 (38%)

164 of 269 (61.0%) in the first subsample, 177 of 301 (58.8%) in the second, and 341 of 570 (59.8%) in the combined sample indicating no interest in dove hunting.

Acknowledgements: I extend my appreciation to Mr. Joseph Mawson of the Department of Forestry and Wildlife Management of the University of Massachusetts for his continuing cooperation in analyzing the Survey.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureal of Wildlife Research and Aanagement

Approved:_____
Richard Cronin, Superintendent

Prepared by_____
James E. Cardoza, Game Biologist

Date_____

PERFORMANCE REPORT

State Massachusetts Project No. W-35-R-19

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Survey

Period Covered: 1 June 1976 to 31 May 1977

Work Plan II Massachusetts White-Tailed Deer Study

Plan Objective: To determine through the collection and analysis of pertinent deer harvest data, the sex and age structure of the herd and to develop management and harvest procedures based on project findings.

Job II-1 Statewide Deer Harvest

Job Objective: To determine the annual harvest of deer in Massachusetts.

Summary: The 1976 statewide deer harvest for all deer seasons was 2,712 deer which is an increase of 175 deer over the 1975 harvest of 2,533 deer. Seventy-two percent of the deer harvest was reported in the four western counties of Berkshire, Franklin, Hampden and Hampshire. Worcester County contributed 6.4 percent of the statewide harvest and Barnstable contributed 2.7 percent. The islands of Dukes County reported 6.6 percent and Nantucket contributed 7.6 percent of the reported harvest. Deer management zones one and two contributed 4.0 percent to the overall statewide deer harvest.

Target Date: 31 August 1977

Progress: On schedule.

Deviations: None

Recommendations: Continue this job. See Job II-4 for future recommendations.

Cost: $65,000

Presentation of Data:

Introduction

In Massachusetts there are four different types of deer hunting seasons. In 1976 (1) a two-day special hunt for paraplegic deer hunters was held on 4-5 November; (2) the 18-day archery season continued from 8 November through 27 November; (3) the six-day shotgun deer season, 6 December through 11 December; and (4) the three-day primitive weapon season from 20 December through 22 December. Hunting is not allowed on Sundays.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Since 1967, Massachusetts has had a statewide antlerless deer hunting permit system for the shotgun season. All hunters may legally harvest a deer with antlers three inches and longer. To harvest a female or a male with antlers less than three inches, the hunter must have been issued an antlerless deer hunting permit. All hunters during all four deer hunting seasons are required to bring their deer to an official deer checking station to be recorded and tagged within 24 hours of harvesting a deer.

Antlerless deer hunting permits are issued on a deer management unit basis. The number of sportsmen's permits per management unit, the deer shotgun harvest per sex, rank of importance, and the percent of the total harvest per management unit is presented in Table 1.

Archery Season

In 1972, the archery season was expanded from 12 days to an 18-day season. A summary of the statewide archery harvest below shows an increase from 76 deer in 1972 to 127 in 1976.

Summary of the Massachusetts Archery Harvest, 1968-1976:

	1968	1969	1970	1971	1972	1973	1974	1975	1976
Male	21	27	24	26	49	51	62	74	94
Female	13	10	12	10	27	26	25	39	33
	34	37	36	36	76	77	87	113	127

The mainland archers reported 102 deer taken consisting of 78 males and 24 females. The four mainland counties with the highest archery harvest in order of importance were Berkshire (50 deer), Franklin (15 deer), Hampden (15 deer), and Hampshire (15 deer).

The Nantucket archers reported 16 deer (8 males and 8 females). Nine deer were reported by Martha's Vineyard bowmen (8 males and 1 female, see Table 2).

Paraplegic Season

Paraplegic hunters took 1 male and 1 female deer during the two-day special season on Martha's Vineyard.

Primitive Firearms Season

During the special three-day primitive firearms deer season, the hunters reported harvesting 49 deer statewide (20 males and 29 females). The kill per county in order of importance is as follows: Franklin, 18; Berkshire, 16; Hampden, 4; Worcester, 3; Dukes, 3; Nantucket, 2; and Hampshire, 2 (see Table 2).

Shotgun Season

During the six-day shotgun only deer season, hunters reported harvesting 2,534 deer. Of these deer, 1,812 were males (192 male fawns) and 722 were females (Table 2). The four top deer-producing counties on the mainland were Berkshire (947), Franklin (479), Hampden (271) and Worcester (165) as indicated on Table 1. The reported shotgun deer harvest of 2,534 represents 93.4 percent of the total deer harvest statewide.

Deer harvest data shows that 1,464 adult males, 129 fawn males and 538 females, a total of 2,131 deer, were taken on the mainland. The Nantucket deer hunters reported 193 deer consisting of 85 adult males, 29 male fawns and 79 females. On Martha's Vineyard, a total of 168 deer were reported taken (52 adult males, 29 male fawns and 87 females). The Gosnold Island hunters reported taking 24 males and 18 females.

A summary of the 1976 Massachusetts shotgun deer harvest by sex and the county rank of importance from 1971 through 1976 is presented in Table 3. Berkshire and Franklin counties have remained the top-ranking counties for the past six years. Hampden and Nantucket counties are in the third and fourth slots. Dukes County ranks fifth followed by Worcester County in the sixth position. Hampshire and Barnstable fill the seventh and eighth slots. Plymouth, Essex, Middlesex, Bristol and Norfolk, in that order, follow.

Total Harvest Figures

Appendix 1 presents a ten-year summary (1967-1976) of the annual deer harvest by town and county. There was an increase of 179 deer above the 1975 kill of 2,533 deer. All preshotgun season indices (statewide reported deer mortalities and the 1976 archery deer hunter success) indicated that the 1976 shotgun season harvest should exceed the 1975 kill.

From 1967 through 1971, there was an annual increase (from 20 to 39 percent) in the female deer harvest due to an increase in the number of antlerless permits issued. In 1972, the number of antlerless permits was reduced to 4,000 permits on the mainland. From 1973 through 1975, the percent of females in the total harvest has remained at a healthy 30 percent. The 1976 percent of females in the harvest is 28. This should increase the 1977 fawn production.

Percent of Females in the Total Harvest

1968	1969	1970	1971	1972	1973	1974	1975	1976
23%	29%	32%	39%	34%	30%	30%	30%	28%

Table 4 presents a summary of the 1976 deer harvest per sex per management unit. The statewide harvest per sex since 1967 is presented as follows:

Kill Statewide for Each Sex, 1968 through 1976

	1968	1969	1970	1971	1972	1973	1974	1975	1976
Male	1104	1451	1629	1385	1504	1477	1949	1779	1927
Female	323	595	776	899	787	644	832	754	785
Total	1427	2046	2406	2284	2291	2121	2781	2533	2712

The ratio of male to female deer determined from the statewide deer harvest for 1976 was one male to .41 females. This ratio has remained constant since 1973. The ratio of male to female in the deer harvest fluctuated with the number of antlerless permits issued. In 1967 and 1968, 2000 sportsmen's permits were issued and the sex ratio was 1 male to .25 females and 1 male to .29 females respectively. In 1969, the number of permits was increased to 4000 and the male-to-female ratio was 1 male to .41 females. The number of antlerless permits was increased to 6000 permits and the ratio of males to females in the harvest was 1 to .43 in 1970 and 1 to .65 in 1971. A slight decline was noted in 1972 of 1 male to .52 females with the reduction of 2000 permits to the present issuance of 4000 permits per year.

The shotgun, archery, primitive and paraplegic hunter harvest per sex per county for 1976 is presented in Table 2.

Antlerless Permit Data

An increase of 1000 antlerless permit applications was recorded for the 1976 season with 34,000 applicants compared to 33,000 in 1975. There were 4000 sportsman permits; 343 farmer-landowner permits; 400 Nantucket and 600 Martha's Vineyard antlerless permits issued in 1976. The 1976 harvest of deer by antlerless permit holders was 992 deer (Table 5).

In 1976, the 343 farmer-landowner permittees reported harvesting 58 deer. Sixteen percent of the 343 permit holders reported taking a deer (Tables 5 and 6).

Table 7 presents a summary of the deer harvest per sportsman permit per deer management unit and the success ratio of antlerless permit holders for 1976. The permit holders success ratio remained about the same as for the 1975 shotgun season with a ratio of 1 to 5 on the mainland; 1 in 4 on the Vineyard, and 1 in 3 on Nantucket.

There were 400 antlerless permits issued for Nantucket Island. The harvest by permit holders showed that the harvest of male fawns was about the same as the previous year with 29 button bucks taken in 1976 and 26 male fawns reported in 1975. The antlered male harvest by permittees decreased by 5 deer in 1976 with 17 reported and 22 reported in 1975.

The female harvest by permittees increased 13 deer with 79 reported in 1976 and 66 reported in 1975. The total harvest by permittees was 125 deer in 1976, a slight increase of 11 deer above the 114 deer reported in 1975 (Table 7).

There were 600 antlerless permits issued for Martha's Vineyard. The permittees harvested 135 deer in 1976. This was a decrease of 2 deer less than the 137 deer reported by permit holders in 1975. There was a slight decrease in the male fawns with 29 button bucks reported in 1976 compared to the 35 skippers reported in 1975. The 19 antlered males reported by permit holders in 1976 was 4 deer less than the reported 23 antlered bucks in 1975 (Table 5). There was an increase of 8 females in the 1976 harvest with 87 reported compared to the 79 females in 1975.

The 4000 antlerless permit holders on the mainland reported harvesting 732 deer. There was a decrease of 2 male fawns from 127 in 1975 to 125 in 1976. The antlered male harvest of 69 deer decreased 21 deer in 1976 from 90 deer in 1975. The female segment increased by 19 from 480 females in 1975 to 499 females in 1976 (Table 5, 6, 7).

* * * * * * * * * * * *

Job II-2 Non-Hunting Deer Mortality Investigations

Job Objective: To determine the annual non-hunting decimating factors of the Massachusetts deer herd.

Brief Summary: From 1 January to 31 December 1976, Natural Resource Officers reported 442 non-hunting deer mortalities. There were 192 males, 221 females and 29 deer with no sex reported resulting in an adjusted sex ratio of 46 percent males to 54 percent females. The highest cause of these mortalities was motor vehicles with 296 deer reported. Dogs caused 58 mortalities and there were 48 illegal kills, 29 dead of unknown causes and 38 from other causes.

Target Date: 31 December 1976.

Progress On schedule.

Deviation: None

Recommendations: A quadruplicate carbonless deer mortality report form should be used to record deer mortalities. The project should continue as it presently exists.

Cost: $14,000

Presentation of Data:

Techniques

Natural Resource Officers report deer mortalities to the Division of Law Enforcement in Boston. A copy of each report is provided to the Division of Fisheries and Wildlife.

Findings

During the period covered by this report, 1 January through 31 December 1976, Natural Resource Officers reported 442 deer mortalities. Of these deer, 192 were males, 221 females and no sex reported on 29 deer. In order of importance, the number and causes were as follows: 296, motor vehicles; 58, dogs; 48, illegal kills; 29, unknown kills; 5, drowned; 3, fences; 2, trains; 1, crop damage and other (Table 8). The peak months were, in descending order: November (87), October (48), March (44), December (42), June (40), February (38), April (29), and September (29), January (28), August (21), May (21), July (18), (Table 11).

A five-year summary, 1971 through 1976, is presented in Table 9 and compares 1976 non-hunting mortalities per cause with the previous five-year average. Non-hunting mortalities for 1976 were all below the five-year average.

The 1976 mortalities are 13 percent below the 1975 figures, 442 versus 508 (Table 10).

The adjusted sex ratio (Table 11) for 1976 non-hunting deer mortalities is as follows:

Adjusted Sex Ratio

100 Males : 115 Females
87 Males : 100 Females
46% Males : 54% Females

The 1975 sex ratio was 39 percent males to 61 percent females.

Table 12 presents the non-hunting deer mortalities ranked by county for the period 1970 to 1976. The three most important counties, in order, are: Berkshire (112), Franklin (61), and Nantucket (60). Nantucket moved to third place from fourth. The permanent Natural Resource Officer on the island seems to account for this increase as in 1974 it was in tenth place. Barnstable County was fourth (49), followed by Worcester (37), Hampden (31), Hampshire (29), Plymouth (19), Essex (19), Middlesex (10), Bristol (7), Dukes (6), and Norfolk (2).

* * * * * * * * * * * *

Job II-3 Deer Fertility Studies

Job Objective: To determine the reproductive rate per age class of the Massachusetts deer herd.

Summary: This job was inactive during the period covered by this report.

Target Date: None

Progress: Inactive

Deviations: None

Recommendations: If funds are available, the job should be continued.

Cost: None

Remarks: Inadequate funds for transportation forced the inactive status of this job.

* * * * * * * * * * * *

Job II-4 Deer Management Recommendations

Job Objective: To determine the size of the Massachusetts deer herd and to recommend management techniques that will provide the deer hunter with the greatest hunting opportunity commensurate with herd population levels.

Summary: There was an increase of 143 deer harvested statewide during the shotgun only season. The slight increase occurred although the hunting conditions were judged to be poor; that is, rain, ice and lack of snow. The adult male harvest of 1,620 deer was an increase of 128 animals above the 1975 harvest of 1,492 adult males. The 1-1/2 year-old male harvest decreased from 303 in 1975 to 222 in 1976 at the mainland biological stations. There was an increase in the 2-1/2 year to 5-1/2 year-old males of 26 deer at these stations.

The calculated minimal population, based on the percent of 1-1/2 year-old males reported at the biological deer check stations, was 14,896 deer. This is an increase of 24.4 percent from the 1975 minimal population figure of 11,975 deer.

The percent frequency ratio of adult females to adult males on the mainland was .25 while on Martha's Vineyard the frequency ratio was .89. On Nantucket, the ratio was .70.

The success ratio of antlerless permit holders for 1976 on the mainland was 1 : 5. On Martha's Vineyard, the success ratio was 1 : 4 and on Nantucket, the ratio was 1 : 3 for successful permit holders.

Target Date: 30 June 1977

Progress: On schedule

Deviations: None

Recommendations: The following numbers of sportsmen's antlerless permits issued per county and/or region are suggested:

County	Number of Sportsmen Antlerless Permits
Barnstable	200
Berkshire	1300
Franklin	700
Hampden	400
Hampshire	300
Worcester	200
Region I*	200
Region II**	200
Martha's Vineyard	600
Nantucket	400
Naushon	50

* Region I - Essex, Middlesex and Norfolk Counties
** Region II - Bristol and Plymouth Counties

The application number of the antlerless permits beginning with first and last numbers for each county and for each type of permit should be recorded and filed in the deer project files. This data will facilitate the programming and the analysis of the deer harvest by permit holders.

Cost: $750

Presentation of Data: A nine-year summary of the sex and age composition of Massachusetts deer at biological deer check stations on the mainland and for six years on Martha's Vineyard and Nantucket Island is presented in Table 13. There were 303 1-1/2 year-old males reported on mainland biological stations in 1975. The 1976 harvest of 1-1/2 year-old males was 222 reported at the biological stations. The sex and age composition on the mainland and the islands appear to be in good shape (Tables 13, 14, 15, and 16).

Analysis of deer harvest data of Worcester County shows sex and age ratios of a healthy deer herd. The expected increase in the herd size has been very slow. Analysis of the harvest data indicates that forces other than hunting pressure are the cause of the slow rate of the herd increase. It is felt that year-round killing of deer by dogs and possibly a serious deer poaching problem could be affecting the Worcester County deer herd. In an effort to combat these decimating forces, the number of antlerless deer hunting permits in that zone will be reduced from 700 to 200 permits starting with the 1977 shotgun deer season.

Table 17 presents a summary of the Massachusetts shotgun deer harvest from 1967 through 1976. The statewide shotgun harvest was 2,534 deer which is an increase of 143 deer. There was a small decline of 7 male fawns (192) from the 1975 harvest. The adult female harvest was up by 41 deer (519) in 1976 compared to the 1975 kill of 478 adult does. Thirty-six percent of the total deer reported during the shotgun season were button bucks and does. The 38 percent figure had remained constant for the three years of 1973 through 1975.

A summary of percent change in adult harvest and calculated minimal populations of deer in Massachusetts, 1968 through 1976, is presented in Table 18. There was an increase of 8.3 percent in the adult male harvest with 1,620 adult bucks reported in 1976 and only 1,492 adult males taken in 1975.

Tables 19 and 20 present a summary of the adult male and female harvest per square mile of deer range per county in Massachusetts from 1971 through 1976. The statewide deer range per square mile data was recently updated using aerial photos taken in 1970 (Land Use Changes and the Massachusetts Deer Herd, 1976, Phillip J. Sczerzenie, Massachusetts Cooperative Wildlife Research Unit, University of Massachusetts, Amherst, Massachusetts). Prior to the updating, the deer range per square mile was based on aerial photographs taken in 1950 and 1951.

The number of adult males per county (Tables 19, 20, and 21) was computed by subtracting the number of male fawns from the reported male harvest found in Table 2. The adult female harvest (Tables 19 and 20) was determined by subtracting the percent of female fawns from the total reported female harvest per county. The percent of female fawns was computed from the reported female harvest at the biological stations (Tables 14, 15 and 16). The adult male and female harvest per county was determined by dividing the square miles of deer range per county into the adult harvest (Tables 19 and 20).

The computed harvest of adult males per square mile of deer range for the mainland in 1976 was .25 antlered bucks. This is the same as in 1975. Dukes County dropped from .70 to .59 adult bucks per square mile while Nantucket increased from 1.99 to 2.32.

The adult female harvest reported on the mainland remained unchanged in 1976 with .07 adult does harvested per square mile of deer range compared to a harvest of .07 adult females reported in 1975. Dukes County increased with .72 females reported in 1976 and .63 adult females reported in 1975. There was an increase of .17 adult does reported taken on Nantucket Island in 1976 with 1.56 adult females reported in 1976 and 1.39 adult does taken in 1975 (Table 20).

A summary of the total harvest of deer in Massachusetts (including shotgun, archery and muzzle loader harvest) per county per sex and the harvest of deer per square mile of deer range in Massachusetts for 1975 is presented in Table 21.

The statewide harvest of deer per square mile of deer range was .45 in 1976. Of the .45 deer, .32 were males and .13 were females. There was an increase of .03 deer per square mile from the 1975 harvest of .42 deer per square mile (Table 21).

Table 1. Summary of the Number of Sportsmen's Antlerless Permits Issued, the Deer Harvest per Deer Management Unit, the Sex of the Harvest, the Ranking Order of Importance as a Deer Producing Unit, and the Percent of the Harvest by Unit for 1976

Unit	Number Antlerless Permits	Male	Female	Total	Rank	Percentage of Total
Berkshire	1,300	702	245	947	1	37
Franklin	700	353	126	479	2	19
Hampden	400	220	51	271	3	13
Worcester	700	118	47	165	6	6
Hampshire	300	107	28	135	7	5
Martha's Vineyard***	600	105	105	210	4	8
Nantucket	400	114	79	193	5	7
Barnstable	200	45	25	70	8	3
Region II**	200	24	6	30	10	1
Region I*	200	25	10	35	9	1
	5,000	1,812	722	2,534		

* Region I includes Middlesex, Norfolk, Essex and Suffolk Counties.
** Region II includes Bristol and Plymouth Counties.
*** Gosnold's 24 males and 18 females included.

Table 2. A Summary of the Shotgun, Archery and Primitive Firearms Hunter Harvest by County for 1976 in Massachusetts

County	Shotgun				Archery				Primitive Firearms				Totals				% of
	M	F	T	BB	M	F	T	BB	M	F	T	BB	M	F	T	BB	Total
Barnstable	45	25	70	4	3	0	3			1	1		48	26	74	4	2.7
Berkshire	702	245	947	50	35	15	50	5	7	9	16		744	269	1,012	55	37.4
Bristol	1	2	3										1	2	3		0.1
Dukes*	81	87	168	29	8	1	9		1**	2**	3**		90	90	180	29	6.6
Essex	13	2	15	2					1		1		14	2	16	2	0.6
Franklin	353	126	479	33	12	3	15	4	7	11	18		372	140	512	37	18.9
Hampden	220	15	271	18	13	3	16	1		4	4		233	58	291	19	10.7
Hampshire	107	28	135	4	10	3	13		2		2		119	31	150	4	5.5
Middlesex	11	6	17	3					1		1		12	6	18	3	0.7
Nantucket	114	79	193	29	8	7	15		2		2		124	87	210	29	7.8
Norfolk	1	2	3										1	2	3		0.1
Plymouth	22	5	27										22	5	27		1.0
Suffolk																	0.0
Worcester	118	47	165	15	5	1	6			3	3		123	51	174	15	6.4
Cosnold	24	18	42	5									24	18	42	5	1.5
Totals	1,812	722	2,534	192	94	33	127	10	21	30	51		1,927	785	2,712	202	100

* Cosnold not included.

** Paraplegic deer hunt - 1 male, 1 female included.

Table 3. County Summary of the 1976 Massachusetts Shotgun Deer Harvest by Sex and the County Rank in Order of Importance from 1971 through 1976.

County	Male	Female	Total	Rank 1976	Rank 1975	Rank 1974	Rank 1973	Rank 1972	Rank 1971
Barnstable	45	25	70	8	8	8	8	8	7
Berkshire	702	245	947	1	1	1	1	1	1
Bristol	1	2	3	12	12	11	12	12	12
Dukes*	81	87	168	5	6	5	3	3	3
Essex	13	2	15	11	10	9	9	9	10
Franklin	353	126	479	2	2	2	2	2	2
Hampden	220	51	271	3	3	3	5	4	5
Hampshire	107	28	135	7	5	6	7	6	8
Middlesex	11	6	17	10	11	12	11	11	9
Nantucket	114	79	193	4	7	7	6	7	6
Norfolk	1	2	3	12	13	13	13	13	13
Plymouth	22	5	27	9	9	10	10	10	11
Suffolk	0	0	0	13	14	13	13	13	13
Worcester	118	47	165	6	4	4	4	5	4
Total	1,788	704	2,492						
Gosnold	24	18	42						
	1,812	722	2,534						

* Gosnold not included

Table 4. A Summary of the 1976 Deer Shotgun Harvest per Sex per Management Unit

Unit	Males	Females	Total	Male Fawns
Berkshire	702	245	947	50
Franklin	353	126	479	33
Worcester	118	47	165	15
Hampshire	107	28	135	4
Hampden	220	51	271	18
Region I	25	10	35	5
Region II	24	6	30	6
Barnstable	45	25	70	4
Martha's Vineyard	81	87	168	29
Nantucket	114	79	193	29
Gosnold	24	18	42	5
Totals	1,812	722	2,534	192

Table 5. Number of Permits and Deer Harvest by Permittees from 1969 through 1976 per Deer Management Unit in Massachusetts

	1969	1970	1971	1972	1973	1974	1975	1976
Permit Applications*	32,000	35,000	37,500	38,000	32,000	30,000	33,000	34,000
Mainland Permits	4,000	6,000	6,000	4,000	4,000	4,000	4,200	4,000
Adult Male	99	124	104	55	67	80	161	69
Fawn Male	107	183	175	136	102	148	125	125
Female	473	612	698	531	396	602	476	499
Totals	679	919	972	722	565	830	762	732
Farmer-Landowner Permits	295	347	270	326	349	358	370	343
Button Buck							10	9
Male	17	25	20	14	19	38	21	10
Female	45	34	26	42	37	42	40	39
Totals	62	59	46	56	56	80	71	58
Nantucket Permits	400	400	400	400	400	400	400	400
Adult Male	29	15	26	23	22	22	17	17
Fawn Male	11	24	29	17	29	26	27	29
Females	49	85	70	61	65	66	74	79
Totals	89	124	125	101	116	114	118	125
Martha's Vineyard Permits			600	600	637**	600	600	600
Adult Male	1	0	30	24	21	25	22	19
Fawn Male	0	1	41	37	35	29	34	29
Females	19	38	95	126	117	95	76	87
Totals	20	39	166	187	173	149	132	135
Total Permits Issued	4,695	6,747	7,270	7,326	5,386	5,358	5,565	5,343
Deer (Antlerless only)	788	1,082	1,260	1,010	854	1,093	1,012	992
Deer (both sexes) All Permits	850	1,141	1,306	1,056	910	1,173	1,083	1,050

* Figures Rounded

** Includes Marshan Island

Table 6. A Summary of the Massachusetts Deer Harvest per Farmer-Landowner Permit per County for the 1976 Shotgun Season

County	Number Issued	Male Fawns	Adult Males	Females	Total
Barnstable	1	0	0	0	0
Berkshire	79	4	5	8	17
Bristol	0	0	0	0	0
Dukes	0	0	0	0	0
Essex	1	0	0	0	0
Franklin	138	3	3	19	25
Hampden	44	1	1	4	6
Hampshire	50	0	1	6	7
Middlesex	0	0	0	0	0
Nantucket	0	0	0	0	0
Norfolk	1	0	1	0	1
Plymouth	0	0	0	0	0
Suffolk	0	0	0	0	0
Worcester	30	1	0	2	3
Totals	343	9	10	39	58

Table 7. A Summary of the Massachusetts Deer Harvest per Sportsman's Antlerless Permit per Deer Management Unit and the Success Ratio of Antlerless Permit Holders for 1976.

County	No. of Permits Awarded	No. of Antlerless Deer Harvest by Permit				Ratio of Deer per Antlerless Permit				Deer	Success Ratio Deer:Antlerless Permit
		Button Buck	Adult Male	Total Male	Female	Button Buck	Adult Male	Male	Female		
Berkshire	1,300	46	28	74	237	1:28	1:46	1:18	1:5	316	1:4
Franklin	700	30	13	43	107	1:23	1:54	1:16	1:7	150	1:5
Worcester	700	14	10	24	45	1:50	1:70	1:30	1:16	69	1:10
Hampshire	300	4	6	10	22	1:75	1:50	1:30	1:14	32	1:9
Hampden	400	17	7	24	47	1:24	1:57	1:17	1:9	71	1:6
Region I	200	5	1	6	10	1:40	1:200	1:33	1:20	16	1:12
Region II	200	6	3	9	23	1:33	1:67	1:22	1:9	32	1:6
Barnstable	200	4	2	6	25	1:50	1:100	1:33	1:8	31	1:6
	4,000	125	69	194	499	1:32	1:60	1:21	1:8	732	1:5
Martha's Vineyard	600	29	19	48	87	1:21	1:32	1:12	1:7	135	1.4
Nantucket	400	29	17	46	79	1:14	1:24	1:9	1:5	125	1:3
Statewide	5,000	183	105	288	665	1:27	1:48	1:17	1:8	992	1:5

Table 8. A Summary of Massachusetts Deer Mortalities Reported by Natural Resource Officers, 1 January through 31 December 1976.

	January			February			March			April			May			June		
	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex
Motor Vehicles	1	6	1	5	11	2	12	16	2	9	11	0	7	12	1	14	20	1
Dogs	5	3	1	9	7	2	5	2		3	2			1		1		
Illegal Kill							1	2	1			1						
Drowned	1				1					1	1							
Fences																	1	
Trains	1																	
Crop Damage and Others																	1	
Unknown		2	1		1	1						1				1	1	
Subtotal	8	16	3	14	19	5	13	20	6	13	14	2	7	13	1	16	23	1
Total (Cum. Total)		28			38	(66)		44	(110)		29	(139)		21	(160)		40	(200)

	July			August			September			October			November			December		
Motor Vehicles	6	10	1	8	8	2	5	13	1	16	19	2	32	20	4	8	9	
Dogs		1						1			1		1	2		1	4	
Illegal Kill					3		2	1		1			10	7		10	9	
Drowned								1										
Fences							1											
Trains										1								
Crop Damage and Others										1								
Unknown							2	2		2	1	1	6	4	1		1	
Subtotal	6	11	1	11	8	2	10	18	1	21	21	3	49	33	5	19	23	0
Total (Cum. Total)		18	(218)		21	(239)		29	(268)		48	(313)		87	(400)		42	(442)

Cause	Male	Female	Unknown Sex	Total
Motor Vehicles	123	155	18	296
Dogs	25	30	3	58
Illegal Kill	26	19	2	48
Drowned	2	3		5
Fences	2	1		3
Trains	2			2
Crop Damage and Others		1		1
Unknown	11	12	6	29
Totals	190	217	29	442

Table 9. Five-Year Summary of Deer Mortalities of Massachusetts Deer Reported by Natural Resource Officers, 1971 through 1976.

Cause	1971	1972	1973	1974	1975	1976	5-Yr. Avg.	Previous 5-Yr. Total
Motor Vehicles	373	321	321	347	362	296	345	1727
Dogs	219	41	36	33	60	58	78	389
Illegal Kills	39	44	23	35	25	48	33	166
Crop Damage	4	1	2	1	0	1	2	8
Unknown Causes	41	35	21	33	29	29	32	159
All Other Causes	18	11	15	18	32	10	19	94
	694	453	420	469	508	442	509	2544

Table 10. A Comparison of Total Non-Hunting Deer Mortalities of Massachusetts Deer from 1970 through 1976.

	1970	1971	1972	1973	1974	1975	1976
No. of Deer	698	694	453	420	469	508	442
Percent Change		-.6%	-34.7%	-7.3%	+11.66%	+8.32%	-13%

Table 11. Comparison of Actual Numbers of Deer Mortalities by Sex* and Adjusted Data for Massachusetts Deer per Month, 1976.

Month	Male	Female	Unknown Sex	Total	Adjusted Male	Adjusted Female
January	8	17	3	28	13	15
February	14	19	5	38	17	21
March	18	20	6	44	20	24
April	13	14	2	29	13	16
May	7	13	1	21	10	11
June	16	23	1	40	19	21
July	6	11	1	18	8	10
August	11	8	2	21	10	11
September	10	18	1	29	13	16
October	21	21	3	45	21	24
November	49	33	5	87	39	50
December	19	23		42	20	22
	192	221	29	442	205	237

Adjusted Sex Ratio

100 males : 115 females
87 males : 100 females
46% males : 54% females

* These data were reported by Natural Resource Officers.

Table 12. The Massachusetts Non-Hunting Deer Mortalities Ranked by County, 1970 through 1976.

County	1970		1971		1972		1973		1974		1975		1976	
	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank
Barnstable	74	4	93	2	72	2	76	2	56	3	54	3	49	4
Berkshire	184	1	175	1	92	1	109	1	148	1	203	1	112	1
Bristol	8	11	6	11	6	11	6	9	6	11	5	10	7	10
Essex	32	7	25	9	20	9	20	6	23	7	24	7	19	8
Franklin	127	2	90	3	66	3	73	3	62	2	58	2	61	2
Hampden	47	6	51	6	45	5	28	5	19	9	28	6	31	6
Hampshire	56	5	65	5	38	6	28	5	37	5	30	5	29	7
Middlesex	22	8	18	10	8	10	14	8	13	10	12	8	10	9
Norfolk			1	13	6	10	3	10	4	12	2	11	2	12
Plymouth	22	8	36	8	21	8	17	7	20	8	11	9	19	8
Suffolk	0	14	0	14	0	14	0	14	0	13	0	12	0	12
Worcester	99	3	99	3	55	4	37	4	42	4	30	5	37	5
Dukes	17	9	17	9	22	7	6	9	24	6	5	10	6	11
Nantucket	11	10	11	10	2	12	3	10	13	10	48	4	60	3

Table 13. Age Composition of Mainland Massachusetts Male Deer Checked at Biological Stations, 1968 through 1976

Age	1968	1969	1970	1971	1972	1973	1974	1975	1976
6 mos.	61	67	121	100	77	69	73	80	61
1-1/2	198	229	263	211	260	237	255	303	222
2-1/2	126	133	147	103	144	173	156	151	159
3-1/2	87	98	97	77	96	90	86	97	107
4-1/2	35	55	59	43	46	47	35	36	43
5-1/2	17	21	21	19	14	18	11	9	10
6-1/2	4	14	7	3	11	7	5	12	2
7-1/2	0	2	7	6	2	6	4	5	2
8 to 9-1/2	0	2	1	1	0	3	0	2	3
10-1/2	0	1	0	0	0	0	0	0	0
Totals	528	652	723	563	563	650	730	695	609

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Table 14. Age Composition of Mainland Massachusetts Female Deer Checked at Biological Stations from 1968 to 1976.

Age	1968	1969	1970	1971	1972	1973	1974	1975	1976
6 mos.	44	76	90	101	90	62	62	71	38
1-1/2	33	55	54	64	57	48	53	50	41
2-1/2	28	55	69	69	56	42	51	42	43
3-1/2	16	36	46	51	51	35	33	33	26
4-1/2	11	24	29	33	22	25	23	15	14
5-1/2	3	11	14	20	14	6	8	10	11
6-1/2	4	0	8	14	10	5	7	4	8
7-1/2	3	2	0	11	2	6	6	3	1
8 to 9-1/2	3	0	0	9	0	2	3	2	4
10-1/2	1	0	0	0	1	0	1	1	0
Totals	146	259	310	372	303	231	247	231	186

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Table 15. Age Composition of Martha's Vineyard, Massachusetts Deer Checked at Biological Stations from 1971 through 1976.

	Males						Females					
Age	1971	1972	1973	1974	1975	1976	1971	1972	1973	1974	1975	1976
6 mos.	39	25	30	27	32	24	31	30	24	32	22	32
1-1/2	41	41	25	32	30	26	11	24	21	21	13	10
2-1/2	14	15	17	9	6	7	16	11	17	12	13	22
3-1/2	8	15	12	19	7	9	11	15	13	9	13	10
4-1/2	4	6	7	5	4	1	4	9	8	5	5	4
5-1/2	3	1	3	1	3	1	3	6	2	5	1	1
6-1/2	0	3	0	0	0	0	2	1	1	2	3	0
7-1/2	1	2	0	1	0	0	2	2	1	0	1	0
8 to 9-1/2	1	0	0	0	0	0	3	1	1	0	0	0
10-1/2	0	0	0	0	0	0	0	0	0	1	0	0
Totals	111	108	94	94	82	68	88	99	88	87	71	79

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Table 16. Age Composition of Nantucket, Massachusetts Deer Checked at Biological Stations from 1971 through 1976.

Age	Males						Females					
	1971	1972	1973	1974	1975	1976	1971	1972	1973	1974	1975	1976
6 mos.	27	17	22	25	27	26	14	21	21	20	26	23
1-1/2	38	19	28	31	28	35	22	16	17	21	23	20
2-1/2	13	12	19	15	14	16	12	12	8	10	7	6
3-1/2	7	12	11	12	11	7	13	5	7	1	6	7
4-1/2	4	0	4	2	4	5	2	5	9	6	6	6
5-1/2	0	3	2	1	0	0	3	0	2	2	1	5
6-1/2	0	0	1	0	0	0	0	1	0	1	2	0
7-1/2	1	0	0	0	0	0	0	1	1	0	1	0
8 to 9-1/2	0	0	0	0	0	0	0	0	0	0	0	0
10-1/2	0	0	0	0	5	0	0	0	0	0	2	0
Totals	90	63	86	86	89	89	66	61	65	61	74	67

Table 17. A Summary of the Massachusetts Shotgun Deer Harvest, 1967 through 1976.

Year	All Males	Adult Males	Button Bucks	All Females	Adult Females	Fawn Females	Total Deer	Total Permits Issued	Button Bucks and Females	% of Total Deer
1967	937	886	53	235	168	67	1,172	2,430	288	25
1968	1,083	1,022	61	310	217	93	1,393	2,331	371	27
1969	1,424	1,299	125	586	415	171	2,010	5,295	711	35
1970	1,598	1,378	220	769	546	223	2,367	7,347	989	42
1971	1,359	1,106	253	889	643	246	2,248	7,270	1,142	51
1972	1,455	1,256	199	760	530	230	2,215	5,326	959	43
1973	1,421	1,258	163	616	444	172	2,037	5,386	779	38
1974	1,878	1,665	213	791	563	228	2,669	5,358	1,004	38
1975	1,691	1,492	199	700	478	222	2,391	5,370	899	38
1976	1,812	1,620	192	722	519	203	2,534	5,343	914	36

Table 13. A Summary of Percentage Change in Adult Harvest and Calculated Minimal Populations of Deer in Massachusetts, 1968 through 1976.

	1968	Percent Change 1968-1969	1969	Percent Change 1969-1970	1970	Percent Change 1970-1971	1971	Percent Change 1971-1972
Adult male harvest	1,022	+ 27.10	1,299	+ 6.08	1,378	- 19.73	1,106	+ 13.56
Calculated adult male population	2,410	+ 31.95	3,180	- 00.82	3,154	- 27.68	2,281	+ 20.78
Calculated adult female population	2,964	+ 35.19	4,007	+ 32.24	5,299	- 22.95	4,083	- 3.67
Calculated minimal populations	8,740	+ 35.01	11,805	+ 27.18	15,014	- 22.93	11,571	- 2.03

	1972	Percent Change 1972-1973	1973	Percent Change 1973-1974	1974	Percent Change 1974-1975	1975	Percent Change 1975-1976	1976
Adult male harvest	1,256	+ 00.02	1,258	+ 32.35	1,665	- 11.60	1,492	+ 8.36	1,620
Calculated adult male population	2,755	+ 11.80	3,080	+ 00.86	3,107	- 03.40	3,005	+ 24.75	3,749
Calculated adult female population	3,933	- 02.11	3,850	+ 21.03	4,660	- 10.30	4,206	+ 22.32	5,145
Calculated minimal populations	11,336	+ 00.83	11,431	+ 13.59	12,984	- 08.00	11,975	+ 24.39	14,896

Table 19. Summary of the Adult Male Deer Harvest per Square Mile of Deer Range per County in Massachusetts, 1971 through 1976 (Shotgun Season)

County	Sq. Mi. Deer Range	1971	1972	1973	1974	1975	1976
Barnstable	267.3	.30	.28	.28	.31	.27	.15
Berkshire	811.8	.43	.47	.53	.85	.74	.80
Bristol	388.8	.003	.003	.003	.01	.01	.002
Essex	302.4	.03	.06	.06	.05	.05	.05
Franklin	621.0	.38	.45	.34	.51	.44	.52
Hampden	468.7	.22	.28	.31	.35	.34	.43
Hampshire	428.8	.15	.23	.23	.27	.34	.24
Middlesex	521.9	.02	.01	.01	.003	.01	.01
Norfolk	274.2	-	-	-	-	.004	.004
Plymouth	743.0	.01	.02	.01	.01	.03	.05
Worcester	1,226.0	.08	.10	.10	.11	.12	.08
Mainland	5,783.9	.16	.19	.19	.27	.25	.25
Dukes*	87.4	1.00	1.16	1.00	.84	.70	.59
Nantucket	36.6	1.74	1.34	1.86	1.69	1.99	2.32

*Gosnold not included.

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Table 20. Summary of the Adult Female Deer Harvest per Square Mile of Deer Range per County in Massachusetts, 1971 through 1976 (Shotgun Season).

County	Sq. Mi. Deer Range	1971	1972	1973	1974	1975	1976
Barnstable	267.3	.10	.10	.06	.12	.04	.07
Berkshire	811.8	.24	.13	.13	.27	.20	.22
Bristol	388.8	-	.003	.003	.003	0	.003
Essex	302.4	.003	.003	-	.01	.01	.01
Franklin	621.6	.28	.23	.13	.13	.14	.15
Hampden	468.7	.09	.08	.07	.07	.09	.08
Hampshire	428.8	.07	.08	.05	.07	.06	.05
Middlesex	521.9	.01	.01	.002	.002	.01	.006
Norfolk	274.2	-	-	-	-	.004	.004
Plymouth	743.0	.002	-	.004	.004	.02	.008
Worcester	1,226.0	.05	.03	.04	.04	.04	.03
Mainland	5,783.9	.09	.08	.05	.08	.07	.07
Dukes*	87.4	.69	.83	1.00	.67	.63	.72
Nantucket	36.6	1.50	1.09	1.20	1.20	1.39	1.56

*Gosnold not included

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Table 21. A Summary of the Total Harvest of Deer in Massachusetts (including shotgun, archery, and muzzle load harvests) per County per Sex and the Harvest of Deer per Square Mile of Deer Range in Massachusetts for 1976.

					Harvest		
County	Males	Females	Total	Sq. Mi. of Deer Range	Total Deer per Sq. Mi.	Males per Sq. Mi.	Females per Sq. Mi.
Barnstable	48	26	74	267.3	.28	.17	.09
Berkshire	744	269	1,012	811.8	1.25	.92	.33
Bristol	1	2	3	388.8	.008	.003	.005
Essex	14	2	16	302.4	.05	.04	.01
Franklin	372	140	512	621.6	.82	.60	.22
Hampden	233	58	291	468.7	.62	.50	.12
Hampshire	119	31	150	428.8	.35	.28	.07
Middlesex	12	6	18	521.9	.03	.02	.01
Norfolk	1	2	3	274.2	.01	.003	.007
Plymouth	22	5	27	473.0	.06	.05	.01
Worcester	123	51	174	1,226.0	.14	.10	.04
Total	1,689	590	2,279	5,783.9	.39	.29.	.10
Dukes*	90	90	180	87.4	2.06	1.03	1.03
Nantucket	124	87	211	36.6	5.76	3.39	2.37
Total	1,903	767	2,670	5,907.9	.45	.32	.13

*Gosnold not included.

Table 22. Percent Frequency Ratio of Adult Females to Adult Males, 1969 through 1976.

County	1969 Adult M.	1969 Adult F.	1969 % Freq.	1970 Adult M.	1970 Adult F.	1970 % Freq.	1971 Adult M.	1971 Adult F.	1971 % Freq.	1972 Adult M.	1972 Adult F.	1972 % Freq.
Barnstable	58	16	.28	80	29	.36	82	25	.30	75	27	.36
Berkshire	371	100	.27	366	138	.38	352	187	.53	373	112	.30
Bristol	3	1	.33	4			1			3	1	.33
Essex	13	4	.31	20	9	.45	12	1	.08	16	1	.06
Franklin	256	93	.36	251	98	.39	232	176	.76	277	141	.51
Hampden	123	32	.26	117	31	.26	103	42	.41	131	38	.29
Hampshire	115	47	.41	114	48	.42	63	31	.49	98	34	.35
Middlesex	13	4	.31	9	6	.67	14	7	.50	3	4	1.33
Norfolk	3				1							
Plymouth	14	6	.43	8	4	.50	7	1	.14	12	0	.00
Suffolk												
Worcester	176	59	.34	192	88	.46	89	60	.67	117	44	.38
Total	1,145	362	.32	1,161	452	.39	955	530	.55	1,105	402	.36
No. of Sportsmen Permits		4,000			6,000			6,000			4,000	
Dukes	62	16	.26	79	31	.39	87	58	.67	102	77	.75
No. of Sportsmen Permits								600			600	
Nantucket	68	35	.51	87	60	.69	64	55	.86	49	40	.82
No. of Sportsmen Permits		400			400			400			400	
Total Number of Permits*		4,695			6,747			7,270			5,326	

* Includes Farmer-Landowner Permits

Table 22 (Continued)

County	1973 Adult M.	1973 Adult F.	1973 % Freq.	1974 Adult M.	1974 Adult F.	1974 % Freq.	1975 Adult M.	1975 Adult F.	1975 % Freq.	1976 Adult M.	1976 Adult F.	1976 % Freq.
Barnstable	77	15	.19	85	31	.36	72	11	.15	41	18	.44
Berkshire	424	109	.26	689	216	.31	601	163	.27	651	176	.27
Bristol				4	1	.25	5			2	1	.50
Essex	16	4	.25	13	3	.23	14	4	.29	14	3	.21
Franklin	213	79	.37	316	76	.24	275	90	.33	320	91	.28
Hampden	145	36	.25	160	37	.23	161	42	.26	202	37	.18
Hampshire	101	22	.22	116	32	.28	146	25	.17	103	20	.19
Middlesex	4	1	.25	2	1	.50	4	3	.75	5	3	.60
Norfolk							1	1	1.00	1	1	1.00
Plymouth	5	2	.40	6	2	.33	16	8	.50	22	4	.18
Suffolk												
Worcester	119	51	.43	133	52	.39	144	44	.31	103	34	.33
	1,104	316	.29	1,524	451	.30	1,439	391	.27	1,464	388	.25
No. of Sportsmen Permits		4,000			4,000			4,200			4,000	
Dukes	86	87	1.01	73	60	.82	61	55	.90	71	63	.39
No. of Sportsmen Permits		600			600			600			600	
Nantucket	68	44	.69	64	44	.69	73	51	.70	85	57	.67
No. of Sportsman Permits		400			400			400			400	
Total Number of Permits*		5,349			5,358			5,570			5,350	

* Includes Farmer-Landowner Permits

Table 23. A Summary of the Shotgun Deer Harvest per Deer Management Unit, the Number of Sportsman Antlerless Permits per Unit, the Square Miles of Deer Range, the Adult Harvest per Unit and the Percent Frequency Ratio of Adult Females to Adult Males for 1976.

Unit	No. of Sportsman Permits	Male		Females		Total Deer Harvest	Sq. Mi. of Deer Range	Adult Male/ Sq. Mi.	Adult Female/ Sq. Mi.	Percent Frequency Adult Female to Adult Male
		Adult	Fawns	Adult	Fawns*					
Barnstable	200	41	4	18	7	70	267.3	.15	.07	.44
Berkshire	1300	651	50	176	69	946	311.8	.80	.22	.27
Franklin	700	320	33	91	35	477	621.0	.52	.15	.28
Hampden	400	202	18	37	14	271	468.7	.43	.08	.18
Hampshire	300	103	4	20	8	135	428.8	.24	.05	.19
Worcester	700	103	15	34	13	165	1226.0	.08	.03	.33
Region I**	200	20	5	7	3	35	1098.5	.02	.006	.35
Region II***	200	24	0	4	2	30	861.8	.03	.005	.17
Dukes	600	71	34	63	42	210	87.4	.81	.72	.89
Nantucket	400	85	29	57	22	193	36.6	2.32	1.56	.67
Totals		1620	192	519	203	2534	5907.9	.27	.09	.32

*Female fawns were calculated using the percent of fawns reported at biological deer checking stations.
** Region I includes Essex, Middlesex and Norfolk Counties.
*** Region II includes Bristol and Plymouth Counties.

Table 22 presents the percent frequency ratio of adult females to adult males from 1969 through 1976. The mainland deer herd appears to be in good shape in regard to the harvest of adult females to adult males (Table 22). On Martha's Vineyard, the adult harvest is approaching a one-to-one frequency and it may be necessary to reduce the number of antlerless permits if it appears that the overall herd is being overharvested (79 adult males:63 adult females; percent frequency ratio 1:.89).

There was a slight increase in the Nantucket harvest and yet the adult male to adult female frequency rate (.70 in 1975 .67 in 1976) has not changed significantly (Table 22).

Table 23 presents a summary by deer management unit of the shotgun deer harvest, the number of sportsmen's antlerless permits issued, the harvest per square mile of deer range for adult male and female deer and the percent frequency ratio of adult females to adult males for 1976. All indices (adult harvest per square mile of deer range, percent frequency adult male to adult female ratios and the male fawn harvest) suggest that the mainland deer herd is is good biological balance; i.e., no out of proportion harvest of any sex or age of deer herd. In Dukes County, the adult deer harvest is almost one adult male to an adult female. The Nantucket harvest of adult males to adult females shows that for every 100 adult males taken 67 adult females are harvested. Apparently the Nantucket deer herd can stand the pressure for another year before it is recommended to reduce the number of antlerless permits for the island.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by: _____
James J. McDonough
Game Biologist

James J. Pottie
Assistant Game Biologist

Date _____

MASS. DA 32.3. W 35 R-19 #1

PERFORMANCE REPORT

State: Massachusetts Project Number: W-35-R-19

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Surveys

Period Covered: 1 June 1976 to 31 May 1977

* * * * * * *

Work Plan III: Census of Game Species

Plan Objectives: To determine trends in Massachusetts populations of mourning dove, bobwhite quail and woodcock.

Job III-1: Mourning Dove Census

Job Objective: To obtain an index of the spring breeding population of mourning doves.

Summary: Calling doves were counted on three randomized routes in cooperation with the U. S. Fish and Wildlife Service's annual mourning dove breeding population census. The total number of calling doves in 1976 decreased 52 percent from 1975 counts on two comparable routes. Data from one route were not available for 1975 and could not be compared.

Target Date: 31 May 1979

Progress: On schedule

Deviations: None

Recommendations: Continue the spring mourning dove census in cooperation with the U. S. Fish and Wildlife Service.

Cost: $73.93 (Project leader man days: 1/2)

Remarks:

Procedures: In accordance with instructions from the U. S. Fish and Wildlife Service, doves were censused by roadside coo-counts between 26 and 28 May on the three randomized routes established in 1967. Division personnel conducted two routes and a Fish and Wildlife Service cooperator conducted a third route.

Findings: Results of the 1976 call count of mourning doves are compared with previous years' data in Table 1.

The total number of calling doves on two routes combined decreased 52 percent from 1975 counts. Route 8 decreased from 19 to 11 doves heard and Route 8A decreased from six to one dove heard. Route 10 had five doves heard in 1976 but data from 1975 was not available for comparison.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Table 1. Doves Heard on Comparable Massachusetts Routes: 1967 to 1976.

	Doves Heard									
Route	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
8	26	11	2	11	10	12	10	0	19	11
8A*	11	1	1	2	1	2	2	2	6	1
10	7	0	1	3	1	2	4	4	**	5
Totals less Route 10	37	12	3	13	11	14	12	2	25	12
Totals (All Routes)	44	12	4	16	12	16	16	6	25	17
Mean	14.7	4.0	1.3	5.3	4.0	5.3	5.3	2.0	8.3	5.7

	Percent 1976 Counts ± From								
	1967	1968	1969	1970	1971	1972	1973	1974	1975
8	- 58	0	+450	0	+ 10	- 8	+ 10	+1100	- 42
8A*	- 91	0	0	+100	0	+100	+100	+100	- 83
10	- 28	+500	+400	+ 67	+400	+150	+ 20	+ 20	N/A
Totals less Route 10	- 68	0	+300	- 8	+ 9	- 14	0	+500	- 52
Totals (All Routes)	- 61	+ 42	+325	+ 6	+ 42	+ 6	+ 6	+183	N/A

* Route relocated 1974.
** Route conducted; data not retained.

The weighted mean number of doves heard per comparable Massachusetts route was 9.9 in 1975 and 16.8 in 1976 (Dolton 1976). Dove population indices in the Eastern Unit, however, decreased 1.4 percent from 1975 and 3.9 percent from the ten-year mean. Linear regression analyses indicate a statistically significant downward trend in Eastern Unit dove populations.

Acknowledgments: I acknowledge the cooperation of Refuge Manager Linda K. Gintoli of Great Meadows National Wildlife Refuge, who conducted the survey on Route 8.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by _____
James E. Cardoza
Game Biologist

Date _____

PERFORMANCE REPORT

State Massachusetts Project No. W-35-R-19

Project Title Game Population Trend and Harvest Survey

Project Type Research and Surveys

Period Covered: 1 June 1976 to 31 May 1977

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Work Plan IV Wild Turkey Restoration Study

Work Plan Objective: To re-establish the wild turkey in the Commonwealth in sufficient numbers to allow for recreational hunting.

Job IV-1 Experimental Turkey Stocking

Job Objective: To re-establish the wild turkey in the Commonwealth in sufficient numbers to allow for recreational hunting.

Summary: Turkeys in the Beartown State Forest area continue to show signs of increased production and dispersal from the release area. Reports in several new locations seem reliable but need verification. Continuing reports from northern Berkshire County probably represent dispersal from Vermont or New York releases. Reports in Hampden County probably represent escaped penned stock.

Target Date: 31 May 1979.

Status of Progress: On schedule.

Deviations: None

Recommendations: 1. Continue evaluation of the Beartown release. Institute spring gobbler call routes or other means to further assess population trends.

2. Continue public information efforts designed to increase the reporting of turkey sightings.

3. Investigate potential release sites in western Massachusetts as to their suitability for future releases of transplanted birds.

Cost: $3253.29 (project leader man-days: 32)

Remarks: Procedures. Turkey abundance was indexed by roadside counts, track counts, and cooperator reports. Snowmobiles were used during the winter to provide access to the areas.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Findings: Beartown State Forest Area

Turkeys continue to disperse from the area of the Beartown release site. Reports were received from several locations in southern Berkshire County.

Broods were observed in two areas in the southern Berkshires. A hen and nine poults were seen in Richmond in July, and three adults and three poults were observed near Monument Mountain in Stockbridge in midsummer. Due to the numbers of birds found in the winter, broods were probably produced in several other locations but reports were not received until winter and the age composition of the flocks could not be determined.

Beartown Forest and adjacent areas remains the focus of western Massachusetts turkey populations. About 25 turkeys were reported in December near Fountain Pond in Great Barrington. Division personnel located old tracks of about seven birds in this area in mid-January and observed about 13-14 one mile south along Three-Mile Hill in mid-February. It is unknown if these birds represent parts of the same flock, and if so, what happened to the remainder of the turkeys.

Tracks of four to five turkeys were found in January near Agawam Lake and Monument Mountain in the area where hens and poults had been seen the previous summer. Tracks of about five turkeys were found along Konkapot Brook in Stockbridge, on the west side of Beartown, and about seven birds were seen by Division personnel off Blue Hill Road at the southwest end of Beartown Forest. Two reports of 20-25 turkeys at the South Lee end of Beartown were received, but were not verified.

Cooperators reported 11-12 turkeys near East Brook off Beartown Mountain Road in December and Division personnel located tracks of about this number in the same area in January. Part of this flock (numbers uncertain due to intervening brush) were seen later that week further north along East Brook. Distances are close enough that these may represent some of the birds seen in East Lee in November and December. Tracks of four toms were located in the center of Beartown, near the old CCC camp. Birds have been found regularly in this same area the past few years.

Few reports were received from Tyringham this year. Tracks of one bird were found on the west slope of Long Mountain and three birds were reported by cooperators crossing a road near the Otis line. Single birds or small groups (4-5) were seen several times on the Monterey side of Beartown Forest and, following a report by cooperators, Western District personnel located tracks of 11-12 turkeys off Route 23 in Monterey. In Otis,

cooperators reported 11, five and three birds in September, November and December 1976. These could not be located by Division personnel in winter and it is unknown if they represent parts of the same flock.

Reliable reports of turkeys were received from Alford (2 birds) in summer 1976 and February 1977, Lenox (1 bird) in September 1976, and West Stockbridge (3 birds) in December 1976 and February 1977. These could not be verified during winter checks. Two reports were received of turkeys in East Mountain State Forest on the Great Barrington-Sheffield line. A winter search failed to locate these birds.

Several reports of up to eight turkeys were received from the Westfield, Russell and Blandford areas during spring 1976 to December 1976. Field searches by Division personnel failed to locate any sign of the turkeys, and investigation by Western District staff later revealed that these may have been escaped pen-raised turkeys.

The ingress of turkeys from Vermont and New York populations appears to be continuing and small flocks may now be resident. Turkeys were reliably reported in Charlemont (up to six birds, one wing-tagged) in September-October 1976, Colrain (tracks of one bird) in November, Florida (tracks of one bird) in November, and North Adams (tracks and sightings of up to five birds) in January 1976 and April 1977.

Statewide Populations

Turkeys remain present on Prescott Peninsula in the Quabbin Reservation. Their behavior remains moderately wild, but their numbers show no dramatic increase. Little time was spent investigating these turkeys during the current segment. Reports from cooperators indicate that broods were produced, with most of the turkeys remaining on the southern half of the Peninsula.

One brood of eight or nine was reported in July and September 1976 near Gunn Brook on Mt. Toby in Sunderland. The hen reported in Mt. Toby Froest during the past segment (W-35-R-18) was not responsible for the brood since she remained sitting on infertile (?) eggs from about 3 May to early July.

One report was received of three turkeys seen in Barre in September 1976. No reports were received from Douglas, Hatfield, or the Holyoke Range, where Quabbin-strain turkeys were released in the late 1960's and early 1970's.

At least 15 game-farm ancestry turkeys persist in the Town of Mt. Washington. They are apparently fed regularly by residents and are very tame in behavior.

A few reports of turkeys were received from several locations in eastern and south-central Massachusetts. The reliability of the observers is unknown and no populations of turkeys are near these areas. If indeed turkeys, these reports may represent escaped or illegally-released penned birds.

Additional Activities: The project leader gave two slide talks and spoke on one radio program regarding the turkey study. An article on turkeys was published in a regional bird magazine.

Acknowledgments: I extend my appreciation to personnel of the Division of Forests and Parks, Division of Law Enforcement, Metropolitan District Commission, and the University of Massachusetts for their cooperation and assistance.

Submitted by:

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
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Prepared by _____
James E. Cardoza
Game Biologist

Date _____

TA.33:EA32.3:10-35-R-19/J6b6

PERFORMANCE REPORT

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State: Massachusetts

Project No.: W-35-R-19

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Survey

Period Covered: 1 June 1976 to 31 May 1977

Work Plan I: Statewide Small Game Harvest

Objectives: To determine the statewide harvest of selected small game and furbearer species and to present recommendations, based upon management practices and regulations, to increase the utilization of certain species.

Job 6: Statewide Otter and Fisher Investigations

Job Objective: To obtain data on the harvest, distribution, age composition and reproductive status of river otter and fisher populations in Massachusetts.

Summary: Mandatory pelt checking stations for otter and fisher were established in 1976. A total of 110 otter were taken by 65 trappers in 59 towns, and 23 fisher were taken by 17 trappers in 17 towns. Two additional fisher were live trapped for a museum. Worcester (33) and Berkshire (23) counties provided the most otter and Worcester (15) yielded the most fisher. Otter were taken primarily in November and December, while most fisher were taken in February. A total of 74 otter and 10 fisher carcasses were received from cooperating trappers. Skulls, bacula and canine teeth are awaiting process. Twenty-three otter reproductive tracts showed a mean of 1.0 corpus luteum each. Analysis of 23 otter stomachs showed game and pan fishes to comprise 43.7 percent of the total volume.

Target Date: 31 May 1979.

Progress: On schedule.

Significant Deviations: None

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Recommendations:

1. Continue tagging of otter and fisher pelts and recording the data in 1978 using the same methods as in the current segment.

2. Continue the collection of carcasses so as to obtain materials for aging and reproductive studies.

3. Process carcasses immediately or as soon as possible after receipt. Reproductive tracts should be examined before preservation so that corpora lutea and placental scars are more readily identified. Uterine horns should be flushed to recover free blastocysts.

4. Weight and measurements should be taken on all whole carcasses.

Cost: $1696.24 (project leader man-days, 15-1/4).

Remarks:

Procedures. Revised regulations instituted in 1976 required all successful otter and fisher trappers to present their pelts to an official checking station for tagging and recording of data. Eight stations (nine for otter) are maintained throughout the season and for two days after the close of the season. Pelts are tagged with locking metal game seals and harvest data are recorded on mimeographed forms and subsequently tabulated by month trapped, town and county trapped in, type of trap used, target species, and sex.

Trappers were requested to voluntarily turn in the carcasses of otter and fisher to a Division installation. Upon receipt of the carcasses, they were tagged with the name of the trapper and the date and town where taken, and stored in a freezer until ready for processing.

Female reproductive tracts were preserved in 10 percent formalin and later examined for corpora lutea and placental scars. Ovaries were dissected free and hand sectioned in approximately 0.5mm sections and examined under 3x magnification. Uterine horns were cut longitudinally prior to examination.

Skulls and bacula were cleaned by dermestids.

A canine tooth (right $\overline{C1}$) was removed by cutting between I3 - I4 and $\overline{PM1}$ - $\overline{PM2}$ with a saber saw, snapping off the partially severed portion with pliers and splitting bone fragments away from the tooth using a chisel. Teeth were then placed in labeled vials and delivered to the Northeast Research Center for Wildlife Diseases for sectioning, staining and reading.

Findings: Otters have always been a legal furbearer in Massachusetts. Harvest records based on license holder reports are available from 1923 to 1951 and based on licensed fur dealer reports from 1952 to 1975. Commencing in 1976, harvests are based on mandatory pelt checking stations.

The 1976-1977 otter trapping season extended for about 17 weeks from 1 November 1976 to 1 March 1977. During this time, trappers took 110 otter (Table 1). Division checking stations processed 108 pelts and the carcasses of two additional otter were turned in but the pelts apparently retained by the trapper. This combined take (110) was seven more than the 1975-1976 harvest (103) and 39 more than a ten-year (1966-1975) mean harvest (71). In 1976-1977, there were 65 trappers taking at least one otter, with a mean harvest of 1.7 otter per trapper (range: 1 to 6).

The first modern fisher season in Massachusetts was in 1972-1973, with an open season from 1 November to 1 March. Harvest records from 1972 to 1975 were based on licensed fur dealer reports. Commencing in 1976, the seasonal fisher take was determined from mandatory pelt checking stations. In 1976-1977, with the season remaining at 17 weeks, fur trappers took 23 fisher with two more live trapped. One of the two live trapped subsequently escaped. Twenty-two pelts and one live animal were examined at checking stations and one additional carcass was turned in by a trapper who apparently retained the pelt. The second live animal (escaped) was not brought to a check station. This total seasonal take (25) was 23 more than in 1975-1976. There were 17 trappers who succeeded in taking at least one fisher, with a mean of 1.5 fisher per trapper (range: 1 to 5).

Table 1. Harvest of Otter and Fisher in Massachusetts, 1966-1976, and 10-Year (1966-1975) and 25-Year (1951-1975) Means.

Species	1966	1967	1968	1969	1970	1971	1972
Otter	82	41	47	104	76	53	71
Fisher		No	Open	Season			0

	1973	1974	1975	1976	Mean 1951-1975	Mean 1966-1975
Otter	66	66	103	110	92	71
Fisher	13	6	2	25*	-	-

*23 taken by fur trappers

Otters were taken in 59 towns in 10 counties during the 1976-1977 season (Table 2). The greatest number were trapped in Worcester County (33), followed by Berkshire (23) and Franklin and Hampshire (13 each).

Table 2. Harvests of Otter and Fisher in Massachusetts, by County, 1976-1977 Season.

County	No. Otter	Percent	No. Fisher	Percent
Berkshire	23	20.9	1	4.0
Bristol	2	1.8	-	-
Dukes	2	1.8	-	-
Essex	8	7.3	1	4.0
Franklin	13	11.8	4	16.0
Hampshire	13	11.8	-	-
Hampden	5	4.6	-	-
Middlesex	6	5.5	4	16.0
Norfolk	3	2.7	-	-
Worcester	33	30.0	15	60.0
Unknown	2	1.8	-	-
Totals	110	100.0	25	100.0

Based on one year's trapper harvest, otters appear well distributed throughout Massachusetts except in the environs of Boston and in southeastern Massachusetts (Figure 1). More information is needed to ascertain their status in these areas.

Fisher were taken in 17 towns in five counties during 1976-1977 (Table 2). Examination of one season's harvest by towns (Figure 2) indicates a primary range in northern Worcester and adjacent Franklin and Middlesex counties with scattered reports in Essex, Berkshire, and southern Worcester counties. Fisher are apparently still expanding their range in Massachusetts.

Otters were trapped primarily in the first half of the season, with 50 (45 percent) taken in November and 40 (36 percent) taken in December (Table 3). Most fisher, however, were taken at the end of the season with 12 animals (48 percent) taken in February.

Table 3. Harvests of Otter and Fisher in Massachusetts, by Month, 1976-1977 Season.

Month	No. Otter	Percent	No. Fisher	Percent
November	50	45.5	5	20.0
December	40	36.4	6	24.0
January	12	10.9	1	4.0
February	5	4.5	12	48.0
Unknown	3	2.7	1	4.0
Totals	110	100.0	25	100.0

Most otter were taken in Conibear traps (73 otter, 63 percent), with an additional 29 taken in leghold traps and eight picked up as road kills. Fisher were taken primarily in leghold traps (13 fisher, 52 percent), with five being road kills, four taken in Conibears, two in live traps and one unknown.

MASSACHUSETTS

CITY AND TOWN LINES

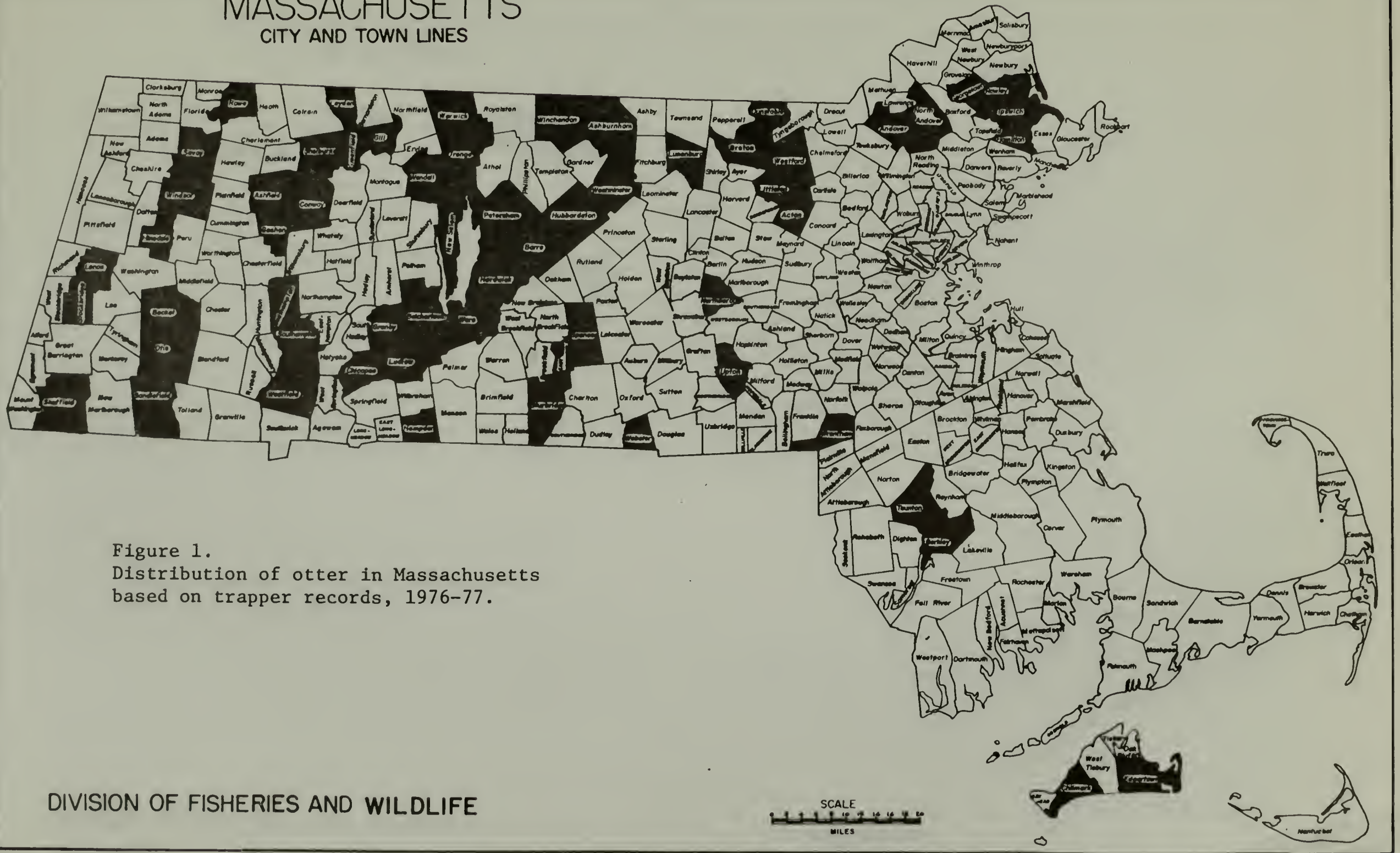

Figure 1.
Distribution of otter in Massachusetts
based on trapper records, 1976-77.

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MASSACHUSETTS

CITY AND TOWN LINES

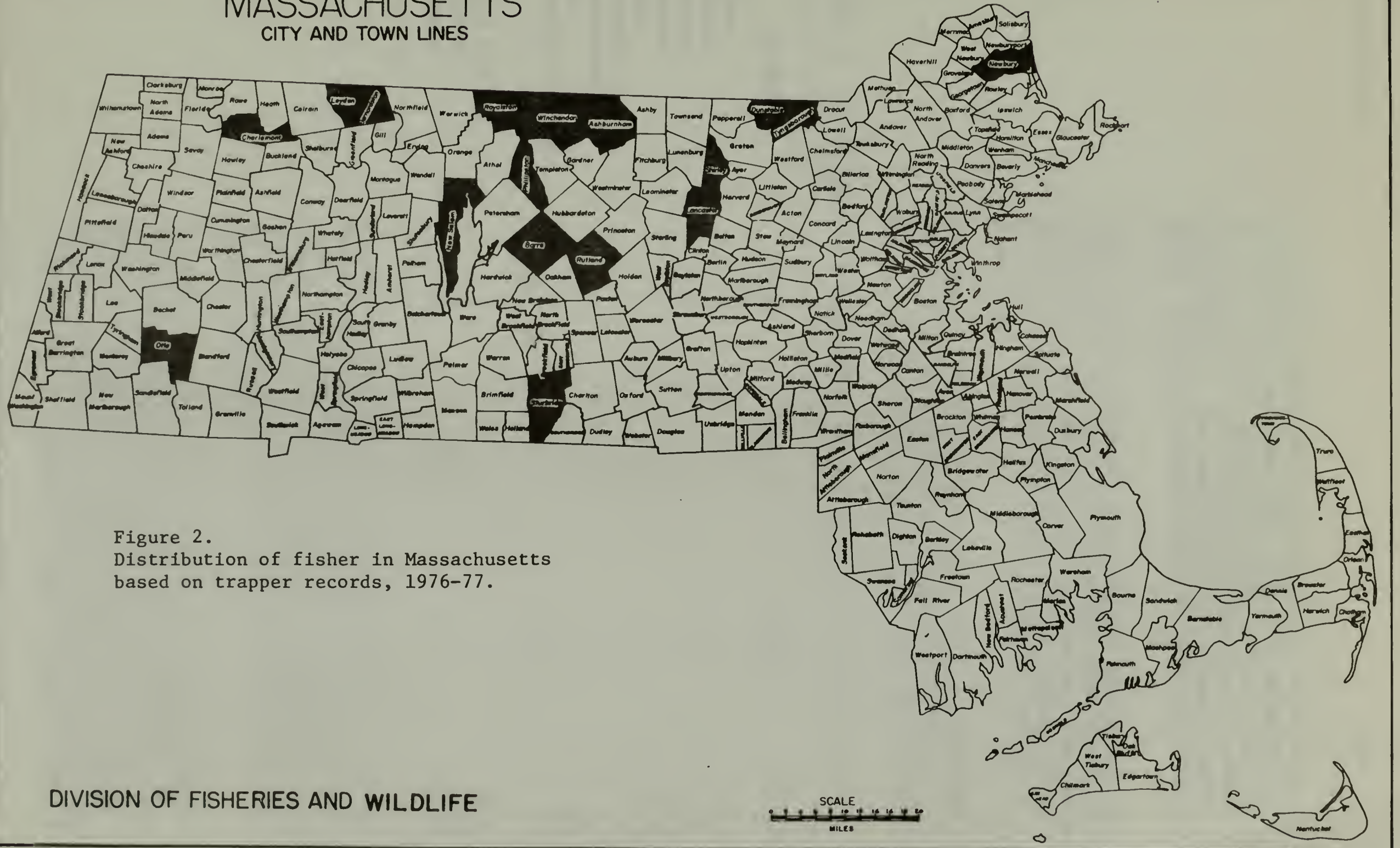

Figure 2.
Distribution of fisher in Massachusetts based on trapper records, 1976-77.

DIVISION OF FISHERIES AND WILDLIFE

Successful trappers were also asked the target species for which they had made their sets. The majority (77; 70%) of the otter taken were caught in otter sets with an additional 14 (12.7%) taken in beaver or otter-beaver sets (Table 4). The remaining 19 were taken by mink, muskrat or raccoon trappers (13), or were road kills (3), or not stated (3).

Fisher, however, showed a less distinct target orientation, with eight (32%) taken in fisher sets, six (24%) in raccoon sets, and five (20%) road kills. The remainder were taken by mink, beaver, or fox trappers (4) or for predator control (1, chicken coop) or were not stated (1).

The average price of an otter pelt (n=35) in 1976-1977 was $69.67, for an estimated harvest valuation of $7696.70. The average fisher price (n=8) was $112.18, for an average harvest valuation of $2804.50.

Table 4. Target Species for Harvested Otter and Fisher in Massachusetts, 1976-1977.

Target	Otter	Percent	Fisher	Percent
Otter	77	70.0	-	-
Fisher	-	-	8	32.0
Beaver	10	9.1	1	4.0
Raccoon	2	1.8	6	24.0
Mink	6	5.5	2	8.0
Muskrat	5	4.6	-	-
Otter-Beaver	4	3.6	-	-
Fox	-	-	1	4.0
Predator Control	-	-	1	4.0
	104		19	
Road kill	3	2.7	5	20.0
Unknown	3	2.7	1	4.0
Totals	110	100.0	25	100.0

A total of 74 otter and 10 fisher carcasses, in varying degrees of preservation, were received from cooperating trappers. Thirty-four (34) of the otter were males and 40 were females, for a sex ratio of 86 males:100 females (45.9% males). Four of the fisher carcasses were males and six were females, for a sex ratio of 67 males:100 females (40% males).

The pelt checking stations, based on trapper response, listed 53 male otter, 42 female, and 13 unknown. On comparison with carcasses, four otter were incorrectly sexed by the trapper (3 females as males, one male as female). Fisher pelt checking records list 13 males, seven females and two unknown. Only one was sexed incorrectly by the trapper (a female reported as a male).

Sixty-two (62) skulls, 63 canine teeth and 27 bacula were obtained from surrendered otter carcasses. We also collected eight fisher skulls, nine canine teeth and three bacula. Skeletal material is now being cleaned in the dermestid colony at the University of Massachusetts. Teeth are being prepared for aging by cementum annuli counts at the Northeast Research Center for Wildlife Diseases.

Several carcasses were received in decomposed or mutilated condition. Consequently, reproductive tracts were removed from only 23 otters. Due to a lack of laboratory facilities at the time of collection, these tracts were stored in formalin for later examination. This preservation hardened and discolored the tracts and made identification of placental scars difficult.

Thirteen of 23 otter tracts showed one or more corpora lutea. A total of 23 corpora lutea were found for a mean of 1.00 corpus luteum per specimen. Discrepancies between this and results of other investigators (Hamilton and Eadie, 1964; 1.9 c.l. per otter, Nov.-Dec.) are probably due to difficulties of identification in preserved specimens.

Twenty-three (23) otter and three fisher stomachs were also collected. The fisher stomachs were preserved in formalin and are being held for later analysis. The otter stomachs were analyzed by Andre J. Loranger of the University of Connecticut. Seven stomachs were empty or contained only trace amounts of food. Game and pan fishes comprised 43.7 percent of the total volume (Table 6) followed by amphibians (41.5%), unidentifiable material (11%), forage fish (1.6%) and unidentifiable fish remains (2.2%). Game and pan fishes, plant matter (not quantified volumetrically) and unidentified fish occurred most frequently (40% each), followed by forage fish, amphibians, and insects.

The Board of Fisheries and Wildlife reduced the fisher trapping season by half from 1 November to 1 March to be 1 November to 31 December commencing fall 1977.

Acknowledgments: I gratefully acknowledge the assistance of the trappers of Massachusetts; Dennis J. O'Connor, Northeast Research Center for Wildlife Diseases; Douglas Smith, University of Massachusetts; Andre J. Loranger, University of Connecticut; and Paul Hotz, Division of Law Enforcement.

Literature Cited:

Hamilton, W. J., Jr. and W. R. Eadie. 1964. Reproduction in the otter, Lutra canadensis. J. Mamm. 45(2): 242-252.

Table 5. Corpora Lutea and Placental Scar Counts from 23 Massachusetts Otter, 1976.

Specimen Number	Date Taken	County Taken In	Corpora Lutea Right	Corpora Lutea Left	Placental Scars* Right	Placental Scars* Left
M123	11/07/76	Worcester	1	-	-	-
M124	Nov. 1976	Unknown	-	1	-	-
M127	11/11/76	Worcester	-	1	-	-
M128	11/16/76	Worcester	1	-	-	-
M129	11/08/76	Berkshire	2	1	-	-
M134	11/25/76	Worcester	1	1	1?	-
M135	12/12/76	Franklin	1	1?	1	1?
M136	11/19/76	Unknown	-	-	-	-
M137	11/15/76	Essex	1	-	-	-
M140	11/21/76	Berkshire	-	-	1?	-
M141	Unknown	Unknown	2	1	-	-
M142	11/21/76	Worcester	-	-	-	-
M144	11/21/76	Berkshire	2	1	-	-
M146	Nov. 1976	Worcester	-	-	-	-
M149	12/19/76	Berkshire	-	-	-	-
M157	12/18/76	Berkshire	1	-	-	1?
M158	12/01/76	Hampshire	2	-	1	-
M161	12/22/76	Worcester	-	-	-	-
M163	12/01/76	Worcester	-	-	-	-
M169	11/16/76	Berkshire	-	-	-	-
M179	12/01/76	Dukes	-	-	-	-
M185	11/26/76	Franklin	-	-	-	2
M187	11/26/76	Franklin	2	-	-	-

* Discoloration of tracts made identification of scars difficult.

Table 6. Late Fall and Early Winter Foods of Otters in Massachusetts*.

Food Item	Number Specimens	Percent Total Volume	Percent Frequency of Occurrence
Game and Pan Fishes			
Centrachidae	10	22.2	13.3
Ameiurus spp.	4	11.9	20.0
Salmo trutta	1	9.6	6.6
	15	43.7	39.9
Forage Fish			
Catostomidae	2	0.5	13.3
Rhinichthys atratulus	1	1.1	6.6
	3	1.6	19.9
Amphibians			
Rana spp.	6	41.5	13.3
Insects	1	-	6.6
Fish Remains	-	2.2	40.0
Unidentified	-	11.0	-
Plant Material	-	-	40.0

* Based on a sample of the 16 stomachs.

Submitted by:

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by: _____
James E. Cardoza
Game Biologist

Date _____

FA5.BA:32-3:W-35-R-19 pt.1

PERFORMANCE REPORT

State: Massachusetts Project No. W-35-R-19

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Surveys

Period Covered: 1 June 1976 to 31 May 1977

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Work Plan VI Black Bear Study

Plan Objectives: To define the range of the black bear in Massachusetts and to define its population characteristics and rate of harvest by hunting.

Job VI-1 Black Bear Population Dynamics

Job Objective: To define the range of the black bear in Massachusetts and to define its population characteristics and rate of harvest by hunting.

Summary: Applications for bear hunting permits were received from 430 sportsmen. Three bear, reported as females, were taken during the open season and one male was illegally shot during deer week. One road kill was reported. New reports of 13 observations totalling 12 bear were received from ten towns.

Target Date: 31 May 1979

Progress: On schedule

Deviations: None

Recommendations:

1. Continue evaluation of bear harvest through checking stations.

2. Based upon the reported sex ratios in the legal and illegal harvests in 1975 and 1976, female bears are being subjected to heavier hunting pressures than males. Should this trend continue in 1977, the season may need to be adjusted. It is also possible that some hunters are mistaking the sex of their bear, since some weights seem large for females. Where possible bears should be carefully examined to verify the sex and reproductive tracts collected from cooperators.

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3. Bear sightings are no longer unusual, and unsolicited reports are seldom received. Some alternate system of population trend evaluation should consequently be instituted. One possibility is to resume surveying permit holders by postal questionnaire or telephone survey. An alternative is to survey hunters at deer checking stations and expand sightings of bear into a population index.

4. Investigate nuisance complaints as necessary. Promote public-education programs to lessen man-bear conflicts.

Cost: $310.26 (project leader man-days: 3½)

Remarks: Procedures: Current bear hunting regulations include the mandatory reporting and tagging of harvested bears. Bear checking stations were maintained daily during deer week at three locations: Birch Hill Wildlife Management Area, Baldwinville; Bitzer State Fish Hatchery, Montague; and Western Wildlife District Headquarters, Pittsfield. When bear were presented for examination, station personnel affixed a metal game seal to the bear, removed a premolar tooth, and recorded the following information: town of kill, date killed, sex and weight of bear, and method of kill.

The Information-Education section issued periodic news releases asking for reports of bear. Cooperating agencies also reported sightings.

Findings: Bear hunting permit applications were received from 430 individuals during the 1976 season (Table 1), with three individuals succeeding in taking a bear. One bear was taken in Savoy, Berkshire County, one in Monroe, Franklin County, and one in Hawley, Franklin County. One bear was taken on each of the first three days of the season. Two were taken with the use of dogs.

Two bears, reported as females, were examined by station personnel. They weighed 57.5 and 62.7 kg (154 and 168 lbs.) dressed, respectively. The third bear was checked as a pelt only (an illegal procedure) and was also reported as a female.

One bear was shot illegally during deer week by a hunter claiming self-defense. The bear was a male weighing 57.8 kg. (155 lbs.) ungutted and was shot in Shelburne, Franklin County, on 10 December. One bear was killed by an automobile on Route 2 in Shelburne in early November. The carcass was disposed of before its sex was determined.

Table 1. Number of Bear Permit Applications and Number of Bear Taken in Massachusetts from 1970 to 1976.

Year	No. Permits	No. Bear Taken	Other Mortalities
1970	214	--	1 illegal kill; 1 road kill
1971	200	--	--
1972	423	1	1 illegal kill
1973	309	--	1 road kill; 1 captured bear
1974	390	2	1 road kill
1975	483	3	2 illegal kills; 3 captured bear
1976	430	3	1 illegal kill; 1 road kill

Findings: cont'd. Premolar teeth collected from legal and illegal bear kills from 1972-1976 were processed by cooperators at the Northeast Research Center for Wildlife Diseases. A breakdown of the age structure of this sample is presented in Table 2. The mean age for all bears (n = 9) was 6.9 years, while the mean age of legally taken bears was 8.3 years.

New reports of bears received during this segment included eight sightings, three hunter kills, one illegal kill, and one road kill for a total of 13 bear reported in 12 towns. Reports by county for the period 1952 to May 1977 are presented in Table 3.

No nuisance complaints were received during this segment.

Two bears taken illegally during 1975 were donated as specimens to the Museum of Comparative Zoology, Harvard University. The road kill from 1976 was donated to the Museum of Natural History at the University of Connecticut.

Table 2. Age structure of the Massachusetts bear harvest, 1972-1976.

Age in years	No. Bear	Specimen No.	Source, date, sex.
1-3/4	1	B415	illegal, 1976, unknown
2-3/4	1	B388	legal, 1975, female
3-3/4	1	B389	illegal, 1975, female
4-3/4	1	B412	legal, 1976, female
5-3/4	1	B386	legal, 1975, female
9-3/4	1	B356	legal, 1974, female
10-3/4	1	B140	legal, 1972, female
14-3/4	2	B357	legal, 1974, male
		B414	legal, 1976, female
$\bar{x}$ = 6.9	9	all bear	
$\bar{x}$ = 8.3	7	all legal bear	

Table 3. Reports of Black Bear by County for Massachusetts, 1952 to May 1977.

County	1952-May 1976	June 1976- May 1977	Total	Percent
Berkshire	162	3	165	35.4
Franklin	167	4	171	36.7
Hampden	24	1	25	5.4
Hampshire	78	4	82	17.6
Middlesex	1	0	1	0.2
Worcester	22	0	22	4.7
	454	12	466	100.0

Acknowledgements: I appreciate the assistance of the Division of Law Enforcement in investigating illegal kills and reporting sightings. Bear teeth were processed by Dennis J. O'Connor of the Northeast Research Center for Wildlife Diseases.

Job VI-2 Historical Records of the Black Bear in Massachusetts.

Job Objective: To determine trends in black bear populations and distribution from precolonial times to the present.

Remarks: The final report on this job has been published (1976) as Research Bulletin 18 "The history and status of the black bear in Massachusetts and adjacent New England States".

Cost: $2634.28 (publication $2500; project leader man-days 2½).

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved:_____
Richard Cronin, Superintendent

Prepared by_____
James E. Cardoza
Game Biologist

Date_____

MASS EA32.3:W-35-R-20/J-2

PERFORMANCE REPORT

State: Massachusetts Project No. W-35-R-20

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Survey

Period Covered: 1 June 1977 to 31 May 1978

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Work Plan I Statewide Game Harvest

Objectives: To determine the statewide harvest of selected small game and furbearer species and to present recommendations, based on management practices and regulations, to increase the utilization of certain species.

Job I-2 Statewide Beaver Harvest

Job Objective: To determine the statewide harvest of beavers by trappers.

Summary: A total of 1666 beaver was taken by 165 trappers in 120 towns during the 1977-78 season. This is the second highest take on record, and the record number of successful trappers. This take was significantly higher than both the 1976-77 take and a five-year (1973-77) average take. Two of five western counties showed statistically significant increases; however, a third county showed no change, and two others showed statistically significant decreases.

Target Date: 31 May 1979

Progress: On schedule.

Significant Deviations: None

Recommendations:

1. Continue tagging of beaver pelts and recording of data in 1978-79, using the same methods as in the current segment.

2. Consider instituting additional means, such as aerial surveys, of monitoring beaver population trends.

3. Analyses of harvest trends shows that the eastern region of the state has dramatically increased its harvests, while the western region has increased slightly or remained about the same. On closer examination, the eastern increase has taken place mostly in Worcester County, and particularly in previously little-occupied or unoccupied range. The western region shows decreases in Hampden, Hampshire, and adjacent southern Berkshire County. Beaver populations in these areas may have reached

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the saturation point, and harvests for the past few years may have reached or exceeded maximum yield levels. We may wish to consider differential zoned seasons in these areas should this slightly decreasing trend continue.

Cost: $634.22 (project leader mandays: 7)

Remarks: Procedures. Each successful beaver trapper is required by regulation to present his pelts to an official checking station for tagging and recording of data. Nine stations are maintained for two days at the close of the season. Trappers may also bring in pelts during the season. Pelts are tagged with locking metal game seals and harvest data are recorded on mimeographed forms and subsequently tabulated by month trapped, town and county trapped in, and type of trap used.

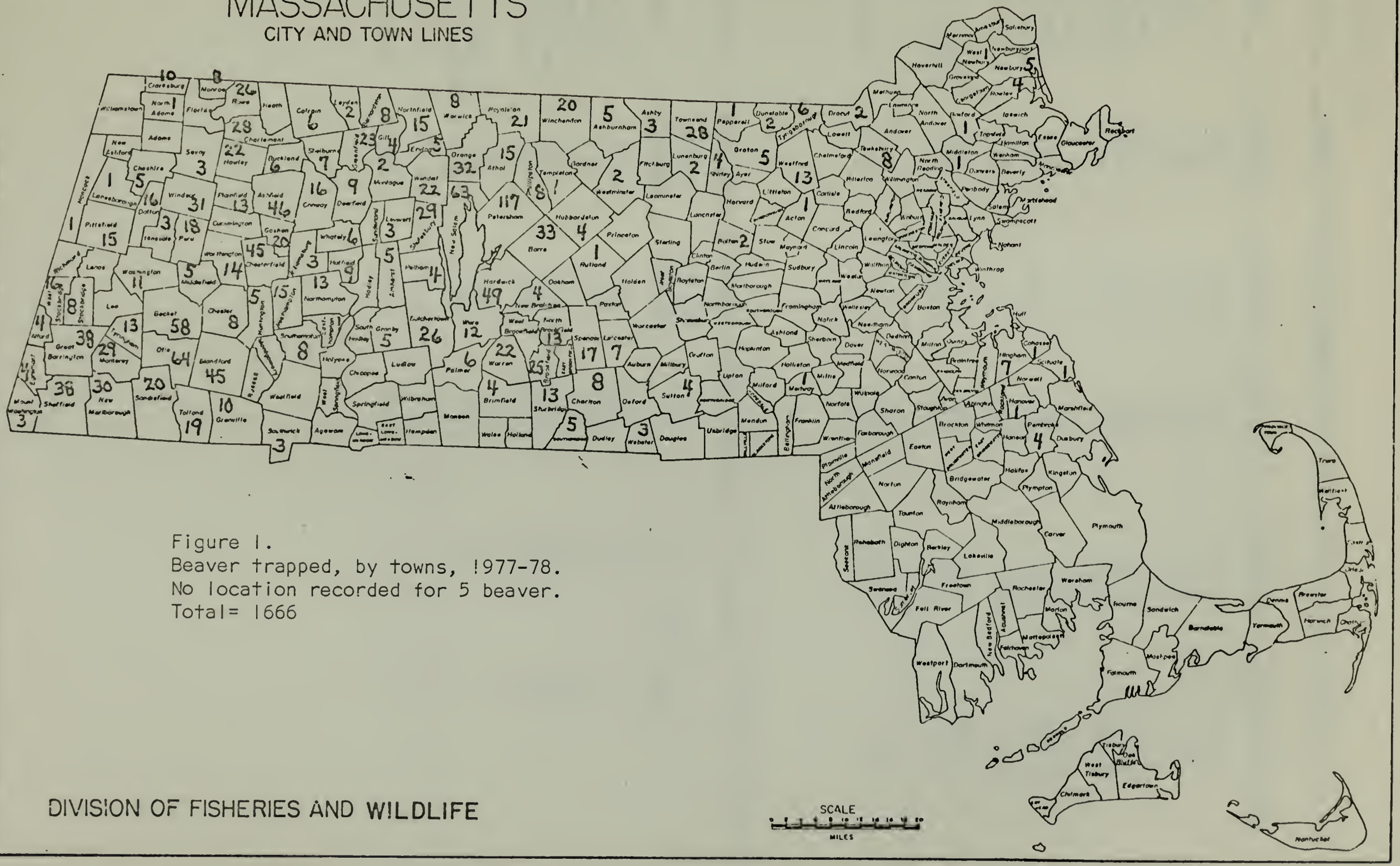
Findings: The 1977-78 beaver trapping season extended for 15 weeks from 15 November 1977 to 28 February 1978. During this period, trappers took 1666 beaver, only eight less than the record take of 1674 in 1972-73. The 1977-78 harvest was 108 more than the previous season's harvest of 1558 and 426 more than a ten-year (1968-1977) average of 1240. There were a record 165 trappers (144 in 1976-77) taking a minimum of one beaver each. The mean harvest per trapper, as in 1976-77, was 10.8 beaver (range: 1 to 102).

Beaver colonies located in 120 towns contributed to the 1977-78 harvest(Figure 1). The greatest harvests were in Berkshire (440, 26.4%), Worcester (427, 25.6%), and Franklin (396, 23.8%) counties (Table 1), followed by Hampshire (203, 12.2%) and Hampden (95, 5.7%) counties. Another 100 beaver were taken in four other counties, with no location being recorded for the remaining five beaver. Of the five western counties, the greatest percent changes from 1976-77 were in Worcester (+34.7), Hampshire (-19.8), and Hampden (-21.5) counties.

Beaver harvests for 1976-77 and 1977-78 for the five western counties were compared statistically by chi square test for goodness of fit (Table 2). Highly significant increases were recorded for Berkshire and Worcester counties, a highly significant decrease for Hampshire county, a significant decrease for Hampden county, and no significant change for Franklin county. The eastern region (those towns east of the Connecticut River) showed a highly significant increase, while the western region showed no significant change.

MASSACHUSETTS

CITY AND TOWN LINES


Williamstown
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Windsor
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Richmond
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Becket
Otis
Sandisfield
Tolland
Granville
Monterey
Great Barrington
Sheffield
New Marlborough
Mount Washington
Savoy
Hawley
Florida
Charlemont
Heath
Rowe
Colrain
Shelburne
Buckland
Conway
Ashfield
Deerfield
Whately
Hatfield
Williamsburg
Northampton
Easthampton
Southampton
Westhampton
Chesterfield
Worthington
Cummington
Plainfield
Goshen
Leverett
Shutesbury
Pelham
Amherst
Granby
South Hadley
Holyoke
Chicopee
Ludlow
Springfield
Wilbraham
Monson
Palmer
Ware
Belchertown
Granby
Granville
Southwick
Agawam
West Springfield
Montague
Leyden
Greenfield
Gill
Erving
Northfield
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Orange
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Winchendon
Ashburnham
Westminster
Fitchburg
Lunenburg
Ashby
Townsend
Pepperell
Dunstable
Tyngsborough
Dracut
Lowell
Tewksbury
Wilmington
Billerica
Chelmsford
Westford
Littleton
Carlisle
Acton
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Sudbury
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Hingham
Cohasset
Scituate
Norwell
Hanover
Marshfield
Pembroke
Duxbury
Kingston
Plymouth
Carver
Plympton
Halifax
Middleborough
Lakeville
Rochester
Bridgewater
Raynham
Taunton
Norton
Mansfield
Easton
Attleborough
North Attleborough
Plainville
Foxborough
Sharon
Stoughton
Canton
Avon
Randolph
Holbrook
Brockton
Whitman
Abington
Rockland
Hanson
Norfolk
Wrentham
Franklin
Bellingham
Medway
Millis
Norwood
Walpole
Westwood
Dover
Sherborn
Natick
Framingham
Ashland
Hopkinton
Holliston
Hopedale
Milford
Upton
Grafton
Auburn
Millbury
Sutton
Oxford
Webster
Dudley
Douglas
Uxbridge
Mendon
Charlton
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Longmeadow
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Northampton
Hadley
Amherst
Pelham
Shutesbury
New Salem
Orange
Wendell
Montague
Sunderland
Leverett
Whately
Deerfield
Conway
Ashfield
Buckland
Shelburne
Gill
Erving
Northfield
Warwick
Royalston
Winchendon
Ashburnham

Table 1. Beaver harvest by county and region, 1976-77 and 1977-78

County	1976-77	Percent	1977-78	Percent	Percent Change
Berkshire	366	23.5	440	26.4	+20.2
Essex	29	1.9	12	0.8	-58.6
Franklin	407	26.1	396	23.8	-2.7
Hampden	121	7.8	95	5.7	-21.5
Hampshire	253	16.2	203	12.2	-19.8
Middlesex	49	3.1	73	4.4	+49.0
Norfolk	0		2	0.1	
Plymouth	16	1.0	13	0.8	-18.8
Worcester	317	20.4	427	25.6	+34.7
Unknown	0		5	0.3	
East region	686	44.0	760	45.6	+10.8
West region	872	56.0	901	54.1	+ 3.3
Statewide	1558	100.0	1666	100.0	+ 6.9

Table 2. Analysis of beaver harvest by county and region, 1976-77 and 1977-78

County	1976-77 harvest	1977-78 harvest	X^2	Sig. Diff./Level	
Berkshire	366	440	13.32	yes	.01
Franklin	407	396	0.30	no	
Hampden	121	95	6.35	yes	.05
Hampshire	253	203	11.10	yes	.01
Worcester	317	427	33.25	yes	.01
East region	686	760	7.60	yes	.01
West region	872	901	0.95	no	
Statewide	1558	1666	7.24	yes	.01

Current harvests were also compared with ten-year (1968-1977) county, regional, and state means (Table 3). Berkshire, Franklin, and Worcester counties, both regions, and the state showed highly significant increases, while Hampden county showed a significant decrease and Hampshire county no significant change.

Harvest breakdowns for 1977-78 were further compared with the means for the past five seasons (1973-77) of identical length (Table 4). Worcester county showed a highly significant increase, Franklin county a significant increase, Berkshire county no significant change, and Hampshire and Hampden counties highly significant decreases. The eastern region and the statewide total showed highly significant increases, while the western region showed a significant decrease.

Harvests were also compared for several individual towns. The current take for the 14 towns with five-year (1973-77) mean harvests of 26 or more beaver were compared with the past season's (1976-77) harvest and with the five-year (1973-77) mean harvest (Table 5). Six towns showed no significant change from 1976-77, five showed highly significant increases, two highly significant decreases, and one a significant decrease. When compared to the five-year mean, six towns showed no significant change, two a highly significant increase, one a significant increase, three highly significant decreases, and two significant decreases. With one exception, the towns showing decreases are in southern Berkshire and adjacent Hampshire county. Hampden county, which showed a decrease as a whole, had no towns in the top 14.

Success continues to be high in the first two weeks of the season. The November take increased over 1976-77 (858, 55.1%) to 960 (57.6%) (Table 6) with an additional 493 (29.6%) taken in December. The remainder (213, 12.8%) were taken in January and February, or were unknown as to month. The January take declined slightly from 1976-77, perhaps due to adverse weather conditions.

Table 3. Analysis of beaver harvest by county, 1977-78 and ten-year mean.

County	Ten-year mean	1977-78 harvest	X^2	Sig. Diff./Level	
Berkshire	388	440	6.97	yes	.01
Franklin	279	396	49.06	yes	.01
Hampden	117	95	4.14	yes	.05
Hampshire	196	203	0.25	no	
Worcester	194	427	279.84	yes	.01
East region	438	760	236.72	yes	.01
West region	800	901	12.75	yes	.01
Statewide	1240	1666	146.35	yes	.01

Table 4. Analysis of beaver harvest by county, 1977-78 and five-year mean.

County	Five-year Mean	1977-78 harvest	X^2	Sig. Diff./Level	
Berkshire	441	440	0.00	no	
Franklin	355	396	4.74	yes	.05
Hampden	151	95	20.77	yes	.01
Hampshire	249	203	8.50	yes	.01
Worcester	223	427	186.62	yes	.01
East region	527	760	71.4	yes	.01
West region	960	901	3.86	yes	.05
Statewide	1489	1666	21.04	yes	.01

Table 5. Analysis of beaver harvest for 14 towns, 1976-77 to 1977-78 and 1977-78 to five-year mean.

Town	1976-77 harvest	1977-78 harvest	X^2	Sig. Diff./ Level	Five-year mean	1977-78 harvest	X^2	Sig. Diff./ Level
Otis	54	64	1.71	no	67	64	0.13	no
Petersham	86	117	9.69	yes .01	58	117	60.02	yes .01
Blandford	46	45	0.02	no	54	45	1.50	no
Becket	48	58	1.90	no	52	58	0.69	no
New Salem	42	63	8.75	yes .01	48	63	4.69	yes .05
Worthington	30	14	13.41	yes .01	46	14	22.26	yes .01
New Marlboro	37	30	1.48	no	44	30	4.45	yes .05
Sandisfield	32	20	5.85	yes .05	42	20	11.52	yes .01
Ashfield	24	46	15.34	yes .01	35	46	3.46	no
Windsor	38	31	1.44	no	34	31	0.26	no
Monterey	11	29	20.31	yes .01	31	29	0.13	no
Winchendon	18	20	0.21	no	31	20	3.90	yes .05
Tyringham	33	13	21.44	yes .01	28	13	8.04	yes .01
Hardwick	31	49	8.53	yes .01	26	49	20.35	yes .01

Table 6. Beaver harvest by month, 1976-77 and 1977-78.

Month	1976-77 No. Beaver	1976-77 Percent	1977-78 No. Beaver	1977-78 Percent
November	858	55.1	960	57.6
December	457	29.3	493	29.6
January	144	9.2	103	6.2
February	71	4.6	78	4.7
Not Stated	28	1.8	32	1.9
Totals	1558	100.0	1666	100.0

The use of the Conibear trap remained high, with 1177 beaver (70.6%) being taken in that style trap. This was a slight decrease from 1976-77, when 73.2 percent were taken in Conibears.

Average pelt prices dropped sharply in 1977-78. Spring prices only were available, averaging $14.66 per pelt for an estimated harvest valuation of $24,423.56.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by: _____
James E. Cardoza
Game Biologist

Date _____

PERFORMANCE REPORT

State: Massachusetts Project No. W-35-R-20

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Surveys

Period Covered: 1 June 1977 to 31 May 1978

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Work Plan I Statewide Small Game Harvest

Work Plan Objectives: To determine the statewide harvest of selected small game and furbearer species and to present recommendations, based upon management practices and regulations, to increase the utilization of certain species.

Job I-6 State Otter and Fisher Investigations

Job Objective: To obtain data on the harvest, distribution, age composition, and reproductive status of river otter and fisher in Massachusetts.

Summary: During 1977-78, a total of 163 otters were taken by 72 trappers in 72 towns for a mean of 2.3 otter per successful trapper. This compares with a take of 110 and a mean of 1.7 for 65 successful trappers in 1976-77. The fisher take increased, despite a two-month reduction in the season, from 25 in 1976-77 to 37 in 1977-78, with 21 trappers taking fisher in 26 towns for a mean of 1.8 fisher per successful trapper. Worcester (50) and Berkshire (43) Counties provided the most otter while Worcester (15) yielded the most fisher. Otter were taken primarily in November and December, and fisher primarily in November. A total of 93 otter and 12 fisher carcasses were received from cooperating trappers. The mean age of otter taken in 1977-78 was 2.56 years and for fisher 1.50 years. This compares with a 1976-77 mean age of 1.65 for otter and 2.39 for fisher. Thirty-eight (38) otter reproductive tracts showed a mean of 1.05 corpora lutea each.

Target Date: 31 May 1979

Progress: On Schedule

Significant Deviations: None

Recommendations:

1. Continue tagging of otter and fisher pelts and recording of data in 1978-79 using the same procedures as in 1977-78.

2. Reduce the length of the fisher season and allow the use of the 220 conibear on land. The 1977-78 harvest increased over 1976-77 despite a two-month reduction in the season. The impact of this increase could not be evaluated due to a paucity of specimen material.

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3. Consider the possibility of changing the opening date of the otter season to 15 November, to coincide with the opening of the beaver season. Consider zoning the open season geographically so as to limit the possible take in southeastern Massachusetts, where otters are apparently scarce. A preliminary harvest level objective of 100 ± 30 otters has been established. Until more information is available, future harvests should be regulated so as to compare with this objective.

4. Provide for the mandatory turn-in of fisher carcasses. The lack of cooperation in this regard hindered effective evaluation of the 1977-78 fisher season. Continue the voluntary turn-in of otter carcasses.

5. Continue to develop expertise in tooth sectioning and aging.

Cost: $2,323.09 (project leader man-days: 23).

Remarks: Procedures. Revised regulations instituted in 1976 required all successful otter and fisher trappers to present their pelts to an official checking station for tagging and recording of data. Nine stations were maintained throughout the season and for two days at the close of the season. Pelts were tagged with locking metal game seals and harvest data recorded on mimeographed forms and subsequently tabulated by month trapped, town and county trapped in, type of trap used, target species, and sex.

Trappers were requested to voluntarily turn in the carcasses of otter and fisher to a Division installation. Upon receipt of the carcasses, they were tagged with the name of the trapper and the date and town where taken and stored in a freezer until ready for processing.

Female reproductive tracts were removed, labeled, and frozen for later examination of corpora lutea. Ovaries were dissected free and hand sectioned in approximately 0.5 mm sections and examined under 3X magnification.

Skulls and bacula were cleaned by dermestids and by boiling.

All skinned, but otherwise complete, carcasses were weighed to the nearest 25 gms and the total length and tail length measured to the nearest millimeter.

A canine tooth (right $\overline{C1}$) was removed by cutting between right $\overline{I3}$ and left $\overline{I3}$ and between right $\overline{PM1}$ - $\overline{PM2}$ with a saber saw, snapping off the partially severed portion with pliers and splitting bone fragments away from the tooth using a chisel. Teeth were then sectioned, stained, and read using procedures recommended by the Northeast Research Center for Wildlife Diseases.

Findings: The 1977-78 otter trapping season extended for about 17 weeks from 1 November 1977 to 28 February 1978. During this time, trappers took 163 otter (Table 1). This take was 53 more than in 1976-77 and 89 more than a ten-year (1967-1976) mean harvest (74). In 1977-78, there were 72 trappers taking at least one otter, with a mean harvest of 2.3 otter per trapper (range: 1 to 8). This compares to 65 successful trappers in 1976-77, with a mean harvest of 1.7 otter.

The 1977-78 fisher season (1 November to 31 December) was reduced by two months from the 1976-77 season (1 November to 1 March). During this revised season, a total of 37 fisher were reported taken by Massachusetts trappers. This is an increase of 12 over 1976-77 (23 plus two live-trapped) and is the highest fisher take on record since the take of this species was legalized in 1972-73.

There were 21 trappers who succeeded in taking at least one fisher, with a mean of 1.8 fisher per trapper (range: 1 to 6). In 1976-77, there were 17 successful trappers with a mean take of 1.5 fisher.

Otters were taken in 72 towns in 10 counties during the 1977-78 season (Table 2). The greatest number were trapped in Worcester County (50), followed by Berkshire (43), Hampshire (24), and Franklin (18). The six remaining counties had less than 10 otter taken each. The distribution of the harvest, by town, is shown in Figure 1.

Fishers were reported trapped in 26 towns in six counties during 1977-78 (Table 2). The greatest number taken were in Worcester County (15). Distribution of the take, by town, is shown in Figure 2.

As in previous seasons otter were trapped primarily in the first half of the season, with 95 (58.3 per cent) taken in November and 42 (25.8 percent) taken in November and 42 (25.8 percent) taken in December. (Table 3). The 1977-78 fisher season was reduced to two months, with the majority of the animals (23) reported taken in November.

Table 1. Harvest of Otter and Fisher in Massachusetts, 1967 - 1977, and ten-year (1967 - 1976) and 25-year (1952 - 1976) means. *

Species	1967	1968	1969	1970	1971	1972	1973	1974
Otter	41	47	104	76	53	71	66	66
Fisher	No	Open	Season			0	13	6

Species	1975	1976	1977	Mean 1952-1976	Mean 1967-1976
Otter	103	110	163	86	74
Fisher	2	25**	37	-	-

* 1967-1975 Data from fur buyers reports and 1976-1977 data from mandatory pelt tag returns

** 23 taken by fur trappers

MASSACHUSETTS

CITY AND TOWN LINES

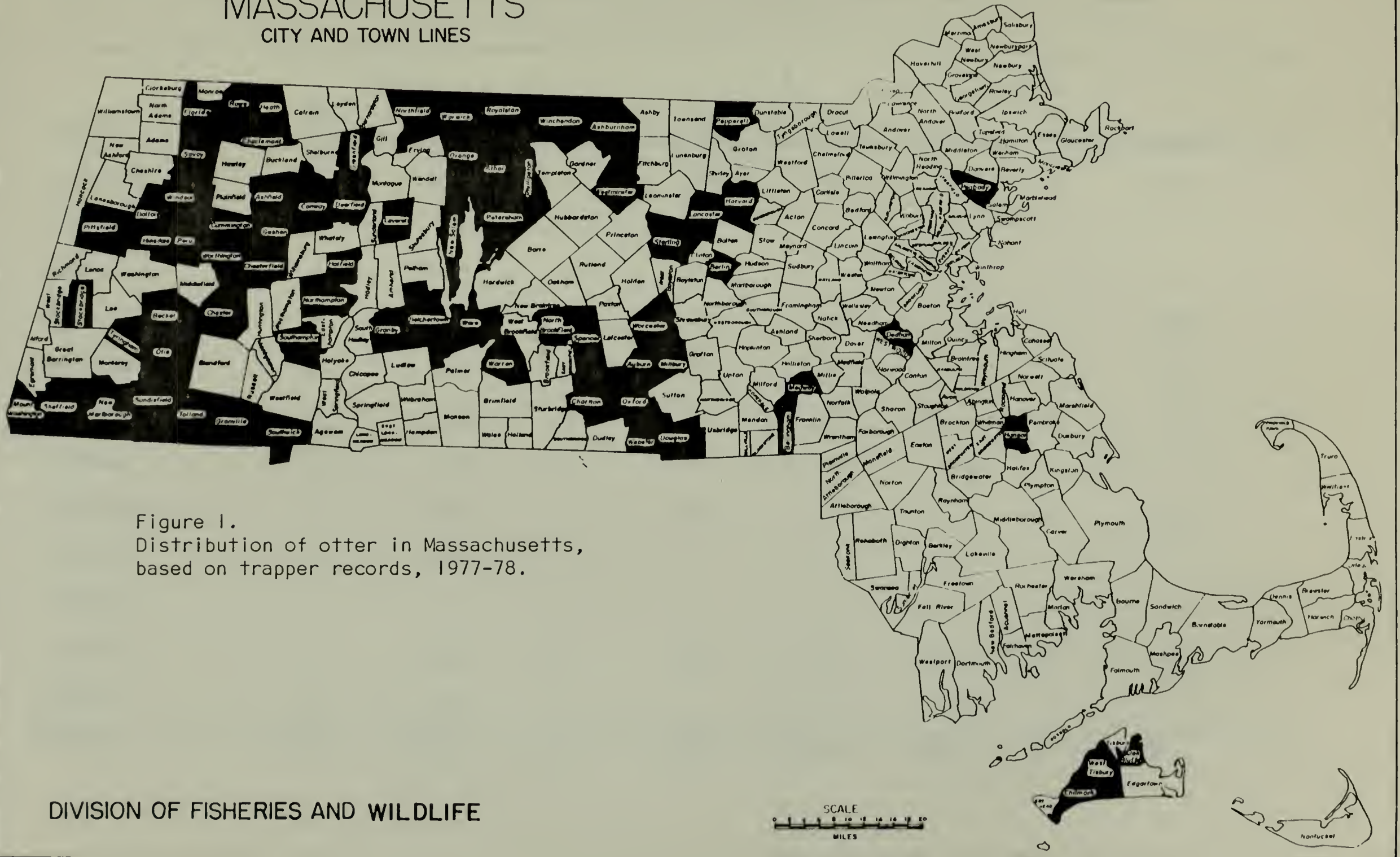

Figure 1.
Distribution of otter in Massachusetts, based on trapper records, 1977-78.

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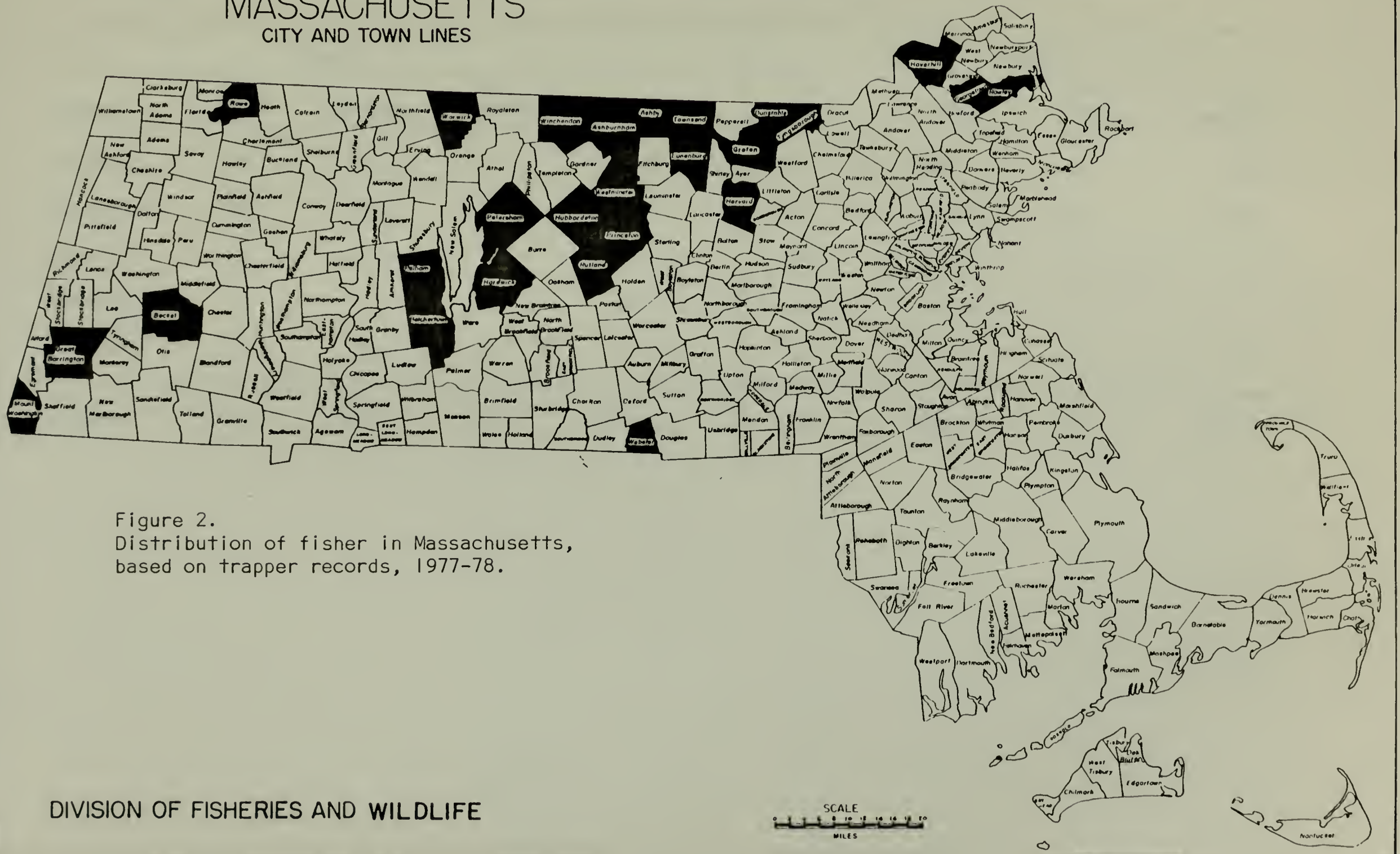
Table 2. Harvests of Otter and Fisher in Massachusetts, by County, 1976-77 and 1977-78 Seasons.

County	1976-77 No. Otter	1976-77 percent	1976-77 No. Fisher	1976-77 percent	1977-78 No. Otter	1977-78 percent	1977-78 No. Fisher	1977-78 percent
Berkshire	23	20.9	1	4.0	43	26.4	5	13.5
Bristol	2	1.3	-	-	-	-	-	-
Dukes	2	1.8	-	-	4	2.5	-	-
Essex	8	7.3	1	4.0	1	0.6	4	10.8
Franklin	13	11.8	4	16.0	18	11.0	2	5.4
Hampshire	13	11.8	-	-	24	14.7	3	8.1
Hampden	5	4.6	-	-	9	5.5	-	-
Middlesex	6	5.5	4	16.0	1	0.6	8	21.6
Norfolk	3	2.7	-	-	7	4.3	-	-
Plymouth	-	-	-	-	1	0.6	-	-
Worcester	33	30.0	15	60.0	50	30.7	15	40.6
Unknown	2	1.8	-	-	5	3.1	-	-
Totals	110	100.0	25	100.0	163	100.0	37	100.0

MASSACHUSETTS

CITY AND TOWN LINES


Clarksburg
Williamstown
North Adams
Florida
Monroe
Rowe
Heath
Colrain
Leyden
Greenfield
Northfield
Warwick
Royalston
Winchendon
Ashburnham
Ashby
Townsend
Pepperell
Dunstable
Tyngsborough
Dracut
Lowell
Methuen
Lawrence
Haverhill
West Newbury
Newburyport
Newbury
Rowley
Ipswich
Essex
Gloucester
Rockport
Andover
North Andover
Boxford
Topsfield
Hamilton
Wenham
Middleton
North Reading
Danvers
Beverly
Manchester
Peabody
Marblehead
Salem
Lynn
Swampscott
Nahant
Winthrop
Boston
Hull
Hingham
Scituate
Norwell
Hanover
Marshfield
Pembroke
Duxbury
Kingston
Halifax
Plympton
Bridgewater
Raynham
Taunton
Norton
Attleborough
North Attleborough
Mansfield
Easton
Brockton
Whitman
Abington
Rockland
Weymouth
Braintree
Quincy
Milton
Dedham
Canton
Stoughton
Sharon
Foxborough
Wrentham
Norfolk
Franklin
Bellingham
Medway
Millis
Medfield
Walpole
Norwood
Westwood
Dover
Needham
Wellesley
Natick
Framingham
Sherborn
Ashland
Holliston
Hopkinton
Milford
Upton
Grafton
Northborough
Southborough
Shrewsbury
Westborough
Worcester
Boylston
Berlin
Hudson
Marlborough
Sudbury
Weston
Waltham
Lincoln
Concord
Lexington
Bedford
Billerica
Carlisle
Acton
Maynard
Stow
Littleton
Chelmsford
Tewksbury
Westford
Dracut
Pepperell
Groton
Shirley
Ayer
Harvard
Fitchburg
Lunenburg
Leominster
Lancaster
Sterling
Clinton
Bolton
Templeton
Gardner
Westminster
Princeton
Hubbardston
Petersham
Phillipston
Athol
Orange
New Salem
Wendell
Erving
Gill
Greenfield
Shelburne
Buckland
Charlemont
Hawley
Heath
Rowe
Florida
Savoy
Adams
New Ashford
Cheshire
Lanesborough
Windsor
Dalton
Hinsdale
Peru
Plainfield
Ashfield
Cummington
Worthington
Goshen
Chesterfield
Williamsburg
Northampton
Easthampton
Southampton
Westfield
Huntington
Russell
Blandford
Otis
Becket
Washington
Lenox
Richmond
Pittsfield
Dalton
Hinsdale
Peru
Windsor
Plainfield
Ashfield
Conway
Deerfield
Whately
Hatfield
Sunderland
Leverett
Shutesbury
Amherst
Pelham
Belchertown
Granby
South Hadley
Holyoke
Chicopee
Ludlow
Springfield
West Springfield
Agawam
Southwick
Granville
Tolland
New Marlborough
Sandisfield
Sheffield
Mount Washington
Egremont
Alford
Great Barrington
Monterey
Tyringham
Lee
Stockbridge
Lenox
Richmond
Otis
Blandford
Chester
Middlefield
Washington
Lanesborough
Cheshire
New Ashford
Adams
Savoy
Hawley
Buckland
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Lenox
Richmond
Pittsfield
Lanesborough
Hancock
Hardwick
Oakham
Barre
Hubbardston
Princeton
Rutland
Holden
Paxton
Boylston
West Boylston
North Brookfield
West Brookfield
Spencer
Leicester
Auburn
Millbury
Grafton
Upton
Hopkinton
Ashland
Sherborn
Natick
Framingham
Wellesley
Needham
Dedham
Westwood
Norwood
Canton
Stoughton
Avon
Sharon
Foxborough
Wrentham
Norfolk
Franklin
Bellingham
Medway
Millis
Medfield
Walpole
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Sudbury
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Waltham
Lincoln
Concord
Lexington
Bedford
Billerica
Carlisle
Acton
Maynard
Stow
Littleton
Chelmsford
Tewksbury
Westford
Dracut
Pepperell
Groton
Shirley
Ayer
Harvard
Fitchburg
Lunenburg
Leominster
Lancaster
Sterling
Clinton
Bolton
Templeton
Gardner
Westminster
Princeton
Hubbardston
Petersham
Phillipston
Athol
Orange
New Salem
Wendell
Erving
Gill
Greenfield
Shelburne
Buckland
Charlemont
Hawley
Heath
Rowe
Florida
Savoy
Adams
New Ashford
Cheshire
Lanesborough
Windsor
Dalton
Hinsdale
Peru

Table 3. Harvests of Otter and Fisher in Massachusetts, by month, 1976-77 and 1977-78 Seasons.

	1976-77				1977-78			
Month	No. Otter	percent	No. Fisher	percent	No. Otter	percent	No. Fisher	percent
November	50	45.5	5	20.0	95	58.3	23	62.2
December	40	36.4	6	24.0	42	25.8	11	29.7
January	12	10.9	1	4.0	19	11.6	-	-
February	5	4.5	12	48.0	5	3.1	-	-
Unknown	3	2.7	1	4.0	2	1.2	3	8.1
Totals	110	100.0	25	100.0	163	100.0	37	100.0

The use of Conibear traps increased in 1977-78, with 123 otter (75.5 percent) taken in that style trap in 1977-78, as compared to 73 (63 percent) in 1976-77. An additional 37 (22.7%) were taken in leg-hold traps, one road kill was reported, and the method of take was not reported for two animals. Fisher were reported as being taken primarily in leg-hold traps, with 26 (70.3 percent) taken in that manner in 1977-78, as opposed to 13 (52 percent) in 1976-77. An additional seven fisher were reported taken in Conibear traps, two were live-trapped, and two road kills were reported.

Successful trappers were asked the target species for which they had made their sets. The majority (126, 77.3 percent) of the otters were taken in otter sets, with an additional 20 (12.9 percent) taken in beaver sets (Table 4). The remaining 17 animals were taken in miscellaneous sets or were not reported as to target.

Fisher continued to show a less specific target orientation, with 17 (45.9 percent) of the harvest taken by fisher trappers, with the remaining 20 taken in a diversity of sets (Table 4).

The average price of an otter pelt in 1977-78 was $51.76, for an estimated harvest valuation of $8,436.88. The average price of a fisher pelt in 1977-78 was $76.65, for a total estimated valuation of $2,836.05. Average prices in 1976-77 were $69.67 for otter and $112.18 for fisher.

A total of 93 otter and 12 fisher carcasses, in varying degrees of preservation and completeness, were received from cooperating trappers. The amount of fisher material was considered to be insufficient for proper evaluation of the harvest. Consequently, mandatory turn-in of carcasses is recommended.

Table 4. Target Species for Harvested Otter and Fisher in Massachusetts. 1976-77 and 1977-78 Seasons

	1976-77				1977-78			
Target Species	No. Otter	percent	No. Fisher	percent	No. Otter	percent	No. Fisher	percent
Otter	77	70.0	--	--	126	77.3	--	--
Fisher	--	--	8	32.0	--	--	17	45.9
Beaver	10	9.1	1	4.0	20	12.9	1	2.7
Raccoon	2	1.8	6	24.0	--	--	4	10.8
Mink	6	5.5	2	8.0	6	3.7	7	18.9
Muskrat	5	4.6	--	--	8	4.3	1	2.7
Fox	4	3.6	--	--	--	--	3	8.1
Predator Control	--	--	1	4.0	--	--	1	2.7
	104		19		160		34	
Road Kill	3	2.7	5	20.0	1	0.6	2	5.5
Unknown	3	2.7	1	4.0	2	1.2	1	2.7
Totals	110	100.0	25	100.0	163	100.0	37	100.0

Broken down by sex, the otter carcasses consisted of 47 males, 47 females, and one for which sex was not recorded, for a ratio of 100 males: 100 females. Six of the fisher carcasses were males and six females, for a sex ratio of 100 males:100 females.

The pelt checking stations, based on trapper response, listed 88 male otter, 60 female, and 15 not sexed. Of those which could be compared with carcasses, eight were incorrectly sexed by the trappers - seven females sexed as males and one male sexed as a female. For fisher, the pelt checking stations listed 22 males, 13 females, and two not sexed. All (8) of those which could be compared with carcasses were sexed correctly by the trappers.

A total of 86 skulls, 91 canine teeth, and 39 bacula were obtained from surrendered otter carcasses. We also collected eight fisher skulls, eight canine teeth, and five bacula. Skulls and bacula from 1976-77 and 1977-78 are being cleaned as time is available.

Canine teeth from 1976-77 were processed by personnel of the Northeast Research Center for Wildlife Diseases, with the assistance of Division personnel. In 1977-78, teeth were processed primarily by Division personnel. Initial results in 1977-78 were inconclusive due to staining problems. Consequently, a large portion of the sample was washed and restained and some teeth were resectioned. The mean age (n=66) for otter taken in the 1976-77 season was 1.65 and for the 1977-78 season (n=79) was 2.56. A breakdown of the otter age structure from 1976-78 is presented in Table 5. The mean age (n=9) of fisher taken in 1976-77 season was 2.39 while in 1977-78 the mean age (n=8) was 1.50. A breakdown of the 1976-78 fisher age structure is presented on Table 6.

Forty-two (42) otter and six fisher stomachs were collected and preserved in formalin for later analysis by cooperators.

Female reproductive tracts (ovaries and uteri) were collected from 41 otters and five fishers. Three otter and three fisher tracts were later found to be unusable due to decomposition or mutilation. Corpora lutea were found in 20 of 38 otter tracts and one of two fisher tracts (Table 7). For otter, a total of 40 corpora lutea were found for a mean of 2.0 c.l. per specimen with corpora lutea (n=20) and 1.05 c.l. per all specimens (n=38). The ovaries in at least 11 animals showing no corpora lutea were minute and undeveloped, and probably represent otters which had not yet reached sexual maturity. The one fisher showing corpora lutea was taken in Middlesex County in December 1977 and showed one corpus luteum in each ovary.

Table 5. Age Structure of Massachusetts Otter Harvest, 1976-77 and 1977-78

	1976-77 Season				1977-78 Season			
Age	Male	Female	Total*	Percent	Male	Female	Total*	Percent
0.5	17	15	33	47.8	18	9	27	29.7
1.5	4	4	10	14.5	10	8	18	19.8
2.5	2	11	13	18.8	5	4	9	9.9
3.5	2	2	4	5.8	3	3	6	6.6
4.5	1	2	4	5.8	3	5	8	8.8
5.5	-	-	-	-	-	1	1	1.1
6.5	2	-	2	2.9	-	2	2	2.2
7.5	-	-	-	-	3	2	5	5.5
8.5	-	-	-	-	-	2	2	2.2
9.5	-	-	-	-	1	-	1	1.1
Unusable	-	-	3	4.4	-	-	12	13.1
Totals	28	34	69	100.0	43	36	91	100.0

* includes unsexed animals

Table 6. Age Structure of Massachusetts Fisher Harvest, 1976-77 and 1977-78

	1976-77 Season				1977-78 Season			
Age	Male	Female	Total*	Percent	Male	Female	Total*	Percent
0.5	2	3	6	66.7	1	2	3	37.5
1.5	-	-	-	--	2	1	3	37.5
2.5	-	1	1	11.1	-	-	-	--
3.5	-	-	-	-	-	-	-	-
4.5	-	-	-	-	1	0	1	12.5
6.5	1	-	1	11.1	-	-	-	-
9.5	-	1	1	11.1	-	-	-	-
Unusable	-	-	-	-	-	-	1	12.5
Totals	3	5	9	100.0	4	3	8	100.0

Table 7. Corpora lutea Counts from 38 Massachusetts Otter, 1977-78 Season

Specimen Number	Date Taken	County Taken	Corpora Lutea Right	Left
213	11-5-77	Worcester	2	0
217	Nov. 77	Unknown	0	0
221	Nov. 77	Unknown	0	2
223	11-16-77	Berkshire	0	0
226	11-17-77	Berkshire	1	2
227	Nov. 77	Unknown	2	1
228	11-20-77	Berkshire	0	2
231	Nov. 77	Unknown	0	0
232	Nov. 77	Unknown	1	1
233	11-26-77	Worcester	0	2
234	11-24-77	Worcester	0	0
235	1977-78 Season	Unknown	0	3
239	12-31-77	Middlesex	2	0
241	11-27-77	Worcester	Missing	0
244	11-18-77	Worcester	1	1
252	Nov. 77	Worcester	1	0
253	12-27-77	Worcester	0	0
254	12-27-77	Worcester	0	0
255	12-19-77	Worcester	2	1
259	12-19-77	Hampshire	0	0
260	12-14-77	Berkshire	0	0
262	11-4-77	Franklin	0	2
263	11-12-77	Franklin	Missing	0
267	1977-78 Season	Unknown	1	1
269	11-25-77	Dukes	0	1
273	11-28-77	Hampshire	0	0
277	12-1-77	Berkshire	0	1
278	Jan. 78	Berkshire	0	0
279	11-9-77	Franklin	0	2
281	1-1-78	Hampshire	1	1
282	12-25-77	Hampshire	0	0
283	12-25-77	Hampshire	0	0
290	11-17-77	Hampshire	1	1
302	11-11-77	Worcester	0	0
304	11-27-77	Berkshire	0	0
307	2-12-78	Berkshire	0	0
309	11-18-77	Essex	0	1
315	1-22-78	Berkshire	0	0

n = 38
unusable = 3
41

n = 20, $\bar{x}$ = 1.05

Acknowledgements: We acknowledge the assistance and cooperation of: the trappers of Massachusetts; Dennis J. O'Connor, Northeast Research Center for Wildlife Diseases; Douglas Smith, University of Massachusetts; Howard Thomas, Northeastern University; Andre J. Loranger, University of Connecticut; and Manuel Correllus, Division of Forests and Parks.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by _____
James E. Cardoza
Game Biologist
Michael J. Brazauskas
Conservation Helper
Thomas J. Early
Conservation Helper

Date _____

PERFORMANCE REPORT

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State: Massachusetts Project No.: W-35-R-20

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Survey

Period Covered: 1 June 1977 to 31 May 1978

Work Plan II: Massachusetts White-Tailed Deer Study

Plan Objective: To determine through the collection and analysis of pertinent deer harvest data, the sex and age structure of the herd and to develop management and harvest procedures based on project findings.

Job II-1: Statewide Deer Harvest

Job Objective: To determine the annual harvest of deer in Massachusetts.

Summary: The 1977 statewide deer harvest for all deer seasons was 3,107 deer which is an increase of 395 deer over the 1976 harvest of 2,712 deer. Seventy percent of the deer harvest was reported in the four western counties of Berkshire, Franklin, Hampden and Hampshire. Worcester County contributed 9.5 percent of the state harvest and Barnstable County contributed 4.3 percent. The islands of Dukes County reported 6.2 percent and Nantucket contributed 6.2 percent of the reported harvest. Deer management zones one and two contributed 3.4 percent to the overall statewide harvest.

Target Date: 31 August 1978

Progress: On schedule.

Deviations: None

Recommendations: Continue this job. See Job II-4 for future recommendations.

Cost: $65,000

Presentation of Data:

Introduction

In Massachusetts, there are four different types of deer hunting seasons. In 1976, (1) a two-day special hunt for paraplegic deer hunters was held on 7-8 November; (2) the 18-day archery season continued from 7 November through 26 November; (3) the six-day shotgun deer season, 5 December through 10 December; and (4) the three-day primitive weapons season from 19 December through 21 December. Hunting is not allowed on Sundays.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Since 1967, Massachusetts has had a statewide antlerless deer hunting permit system for the shotgun season. All hunters may legally harvest a deer with antlers three inches and longer. To harvest a female or a male with antlers less than three inches, the hunter must have been issued an antlerless deer hunting permit. All hunters during all four deer hunting seasons are required to bring their deer to an official deer checking station to be recorded and tagged within 24 hours of harvesting a deer.

Antlerless deer hunting permits are issued on a deer management unit basis. The number of sportsmen's permits per management unit, the deer shotgun harvest per sex, rank of importance, and the percent of the total harvest per management unit is presented in Table 1.

Archery Season

In 1972, the archery season was expanded from 12 days to an 18-day season. A summary of the statewide archery harvest below shows an increase from 76 deer in 1972 to 142 in 1977.

Summary of the Massachusetts Archery Harvest, 1969-1977

	1969	1970	1971	1972	1973	1974	1975	1976	1977
Male	27	24	26	49	51	62	74	94	103
Female	10	12	10	27	26	25	39	33	39
	37	36	36	76	77	87	113	127	142

The mainland archers reported 132 deer taken consisting of 94 males and 38 females. The four mainland counties with the highest archery harvest in order of importance were Berkshire (33 deer), Franklin (32 deer), Hampden (21 deer), and Hampshire (18 deer).

The Nantucket archers reported 8 deer (7 males and 1 female). Two male deer were reported by Martha's Vineyard bowmen (see Table 2).

Paraplegic Season

Paraplegic hunters were unsuccessful during the two-day special season on Martha's Vineyard and Nantucket.

Primitive Firearms Season

During the special three-day primitive firearms deer season, the hunters reported harvesting 130 deer statewide (65 males and 65 females). The kill per county in order of importance is as follows: Franklin, 49; Berkshire, 30; Worcester, 25; and Hampshire, 12. Others were Hampden, 6; Nantucket, 2; and 1 each in Barnstable, Dukes and Plymouth (see Table 2).

Shotgun Season

During the six-day shotgun only deer season, hunters reported harvesting 2,835 deer. Of these deer, 2,051 were males (181 male fawns) and 784 were females (Table 2). The four top deer-producing counties on the mainland were Berkshire (972), Franklin (525), Hampden (256), and Worcester (255) as indicated on Table 1. The reported shotgun deer harvest of 2,835 represents 91.4 percent of the total deer harvest statewide (Table 1 and 2).

Deer harvest data shows that 1,744 adult males, 116 fawn males and 600 females, a total of 2,460 deer, were taken on the mainland. The Nantucket deer hunters reported 183 deer consisting of 64 adult males, 28 male fawns and 91 females. On Martha's Vineyard, a total of 144 deer were reported taken (49 adult males, 28 male fawns and 67 females). The Gosnold Island hunters reported taking 22 males and 26 females (Tables 1 and 2).

A summary of the 1977 Massachusetts shotgun deer harvest by sex and the county rank of importance from 1972 through 1977 is presented in Table 3. Berkshire and Franklin Counties have remained the top ranking counties for the past six years. Hampden and Worcester Counties are in the third and fourth slots. Hampshire County ranks fifth followed by Nantucket County in the sixth position. Dukes and Barnstable fill the seventh and eighth slots. Essex, Plymouth, Middlesex, Norfolk and Bristol, in that order, follow.

Total Harvest Figures

Appendix 1 presents a ten-year summary (1968-1977) of the annual deer harvest by town and county. There was an increase of 395 deer above the 1976 kill of 2,712 deer.

From 1967 through 1971, there was an annual increase (from 20 to 39 percent) in the female deer harvest due to an increase in the number of antlerless permits issued. In 1972, the number of antlerless permits was reduced to 4,000 permits on the mainland. From 1973 through 1975, the percent of females in the total harvest has remained at a healthy 30 percent.

Percent of Females in the Total Harvest

1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
23%	29%	32%	39%	34%	30%	30%	30%	28%	29%

Table 4 presents a summary of the 1977 deer harvest per sex per management unit. The statewide harvest per sex since 1969 is presented as follows:

Kill Statewide for Each Sex, 1969 through 1977

	1969	1970	1971	1972	1973	1974	1975	1976	1977
Male	1451	1629	1385	1504	1477	1949	1779	1927	2219
Female	595	776	899	787	644	832	754	785	888
Totals	2046	2406	2284	2291	2121	2781	2533	2712	3107

The ratio of male to female deer determined from the statewide deer harvest for 1977 was one male to .40 females. This ratio has remained constant since 1973. The ratio of male to female in the deer harvest fluctuated with the number of antlerless permits issued. In 1967 and 1968, 2000 sportsmen's permits were issued and the sex ratio was 1 male to .25 females and 1 male to .29 females respectively. In 1969, the number of permits was increased to 4000 and the male-to-female ratio was 1 male to .41 females. The number of antlerless permits was increased to 6000 permits and the ratio of males to females in the harvest was 1 to .43 in 1970 and 1 to .65 in 1971. A slight decline was noted in 1972 of 1 male to .52 females with the reduction of 2000 permits to the present issuance of 4000 permits per year.

The shotgun, archery, primitive and paraplegic hunter harvest per sex per county for 1977 is presented in Table 2.

Antlerless Permit Data

The number of applications for antlerless permits remained unchanged at 34,000 for the 1977 season. There were 3500 sportsman permits; 343 farmer-landowner permits; 400 Nantucket and 600 Martha's Vineyard antlerless permits issued in 1977. The 1977 harvest of deer by antlerless permit holders was 1018 deer (Table 5).

In 1977, the 343 farmer-landowner permittees reported harvesting 58 deer. Sixteen percent of the 343 permit holders reported taking a deer (Tables 5 and 6).

Table 7 presents a summary of the deer harvest per sportsman permit per deer management unit and the success ratio of antlerless permit holders for 1977. The permit holders' success ratio for the 1977 shotgun season was 1 to 4 on the mainland; 1 in 5 on the Vineyard, and 1 in 3 on Nantucket.

There were 400 antlerless permits issued for Nantucket Island. The harvest by permit holders showed that the harvest of male fawns was about the same as the previous year with 28 button bucks taken in 1977 and 29 male fawns reported in 1976. The antlered male harvest by permittees decreased by 11 deer in 1977 with 6 reported and 17 reported in 1976.

The female harvest by permittees increased 12 deer with 91 reported in 1977 and 79 reported in 1976. The total harvest by permittees was 125 deer in 1977 and 125 deer were reported in 1976 (Table 7).

There were 600 antlerless permits issued for Martha's Vineyard. The permittees harvested 116 deer in 1977. This was a decrease of 19 deer less than the 135 deer reported by permit holders in 1976. There was a slight decrease in the male fawns with 28 button bucks reported in 1977 compared to the 29 skippers reported in 1976. The 21 antlered males reported by permit holders in 1977 was a 2-deer increase above the reported 19 antlered bucks in 1976 (Table 5). There was a decrease of 20 females in the 1977 harvest with 67 reported compared to the 87 females in 1976.

The 3500 antlerless permit holders on the mainland reported harvesting 825 deer. There was a decrease of 6 male fawns from 125 in 1976 to 119 in 1977. The antlered male harvest of 80 deer increased 29 deer in 1977 from 69 deer in 1976. The female segment increased by 127 from 499 females in 1976 to 626 females in 1977 (Tables 5, 6, 7).

* * * * * * * * * * * * * *

Job II-2 Non-Hunting Deer Mortality Investigations

Job Objective: To determine the annual non-hunting decimating factors of the Massachusetts deer herd.

Brief Summary: From 1 January to 31 December 1977, Natural Resource Officers reported 511 non-hunting deer mortalities. Of these mortalities, 208 were males, 267 females and no sex reported for 36 deer. The adjusted sex ratio is 44 percent males and 56 percent females. The highest cause of these mortalities was motor vehicles with 341 deer reported. Dogs caused 73 deaths and there were 57 illegal kills, 28 unknown causes and 12 from other causes.

Target Date: 31 December 1977.

Progress: On schedule

Deviations: None

Recommendations: A quadruplicate carbonless deer mortality report form should be developed and used to record deer mortalities. The possibility of having additional law enforcement officers (local and state police) report deer mortalities should be investigated. The project should continue as it exists.

Cost: $14,000

Presentation of Data:

Techniques

Natural Resource Officers report deer mortalities to the Division of Law Enforcement in Boston. A copy of each report is forwarded to the Division of Fisheries and Wildlife.

Findings

During the period covered by this report, 1 January through 31 December 1977, Natural Resource Officers reported 511 non-hunting deer mortalities. Of these deer, 208 were males, 267 females and no sex reported for 36 deer. In order of importance, the number and causes were as follows: 341, motor vehicles; 73, dogs; 57, illegal kills; 28, unknown causes; 8, crop damage and other causes; 6, drowning; and 2, fences (Table 8). The peak months were, in descending order: November (95), October (69), December (63), February (52), May (42), September (36), March (34), April (31), June (30), August (28), January (20) and July (11). See Table 11.

A five-year summary, 1972 through 1977, is presented in Table 9 and compares 1977 non-hunting mortalities by cause with the previous five-year average. There was a slight increase in reported mortalities due to motor vehicles, dogs and illegal kills while crop damage, unknown causes and all other causes remained about average.

The 1977 non-hunting deer mortalities are 16 percent above the 1976 figures of 511 versus 442 (Table 10).

The adjusted sex ratio (Table 11) for the 1977 non-hunting deer mortalities is as follows:

Adjusted Sex Ratio

100 males : 128 females
80 males : 100 females
44% males : 56% females

The 1976 adjusted sex ratio was 46 percent males to 54 percent females.

Table 12 presents the non-hunting mortalities ranked by county for 1971 through 1977. The three most important counties, in order, are: Berkshire (154), Nantucket (69) and Worcester (54). The succeeding counties were: Franklin (50), Hampshire (46), Barnstable (42), Hampden (33), Essex (29), Middlesex (12), Plymouth (11), Norfolk (4) Bristol (3), Dukes and unknown (2) and Suffolk (0).

* * * * * * * * * * * * * *

Job II-3 Deer Fertility Study

Job Objective: To determine the reproductive rate per age class of the Massachusetts deer herd.

Summary: This job was inactive during the period covered by this report.

Target Date: None

Progress: Inactive

Deviations: None

Recommendations: If funds are available, the job should be continued. Periodic monitoring to analyze if the rates have changed are critical to proper evaluation of the overall population structure.

Cost: None

Remarks: Inadequate funds for transportation forced the inactive status of this job.

* * * * * * * * * * * * * *

Job II-4 Deer Management Recommendations

Job Objective: To determine the size of the Massachusetts deer herd and to recommend management techniques that will provide the deer hunter with the greatest hunting opportunity commensurate with herd population levels.

Summary: There was an increase of 301 deer harvested statewide during the shotgun only season. The adult male harvest of 1,870 deer was an increase of 250 animals above the 1976 harvest of 1,620 adult males. The 1-1/2 year-old male harvest increased from 222 in 1976 to 287 in 1977 at the mainland biological stations. There was a slight increase in the 2-1/2 year to 5-1/2 year-old males of 29 deer at these stations.

The calculated minimal population, based on the percent of 1-1/2 year-old males reported at the biological deer check stations was 14,053 deer. This is a decrease of 5.66 percent from the 1976 minimal population figure of 14,896 deer.

The percent frequency ratio of adult females to adult males on the mainland was .26 while on Martha's Vineyard the frequency ratio was 1.13. On Nantucket, the ratio was .98.

The success ratio of antlerless permit holders for 1977 on the mainland was 1 : 4. On Martha's Vineyard, the success ratio was 1 : 5 and on Nantucket, the ratio was 1 : 3 for successful permit holders.

Target Date: 30 June 1977.

Progress: On schedule.

Deviations: None

Recommendations: The following numbers of sportsmen's antlerless permits issued per deer management unit are suggested:

Barnstable	200
Berkshire	1800
Franklin	900
Hampden	400
Hampshire	300
Worcester	200

Region I*	200
Region II**	200
Martha's Vineyard	400
Nantucket	300
Naushon	50

* Region I - Essex, Middlesex and Norfolk Counties
** Region II - Bristol and Plymouth Counties

The application number of the antlerless permits beginning with first and last numbers for each county and for each type of permit should be recorded and filed in the deer project files. This data will facilitate the programming and the analysis of the deer harvest by permit holders.

Cost: $750

Presentation of Data: A nine-year summary of the sex and age composition of Massachusetts deer at biological deer check stations on the mainland and for six years on Martha's Vineyard and Nantucket Island is presented in Table 13. There were 222 1-1/2 year-old males reported on mainland biological stations in 1976. The 1977 harvest of 1-1/2 year-old males was 287 reported at the biological stations. The sex and age composition on the mainland and the islands appear to be in good shape (Tables 13, 14, 15, and 16).

Table 17 presents a summary of the Massachusetts shotgun deer harvest from 1968 through 1977. The statewide shotgun harvest was 2835 deer which is an increase of 301 deer. There was a small decline of 11 male fawns (181) from the 1976 harvest. The adult female harvest was up by 39 deer (558) in 1977 compared to the 1976 kill of 519 adult does. Thirty-four percent of the total deer reported during the shotgun season were button bucks and does.

A summary of percent change in adult harvest and calculated minimal populations of deer in Massachusetts, 1969 through 1977, is presented in Table 18. There was an increase of 15.4 percent in the adult male harvest with 1870 adult bucks reported in 1977 and only 1620 adult males taken in 1976.

Tables 19 and 20 present a summary of the adult male and female harvest per square mile of deer range per county in Massachusetts from 1972 through 1977. The statewide deer range per square mile data was recently updated using aerial photos taken in 1970 (Land Use Changes and the Massachusetts Deer Herd, 1976, Phillip J. Sczerzenie, Massachusetts Cooperative Wildlife Research Unit, University of Massachusetts, Amherst, Massachusetts). Prior to the updating, the deer range per square mile was based on aerial photographs taken in 1950 and 1951.

The number of adult males per county (Tables 19, 20, and 21) was computed by subtracting the number of male fawns from the reported male harvest found in Table 2. The adult female harvest (Tables 19 and 20) was determined by subtracting the percent of female fawns from the total reported female harvest per county. The percent of female fawns was computed from the reported female harvest at the biological stations (Tables 14, 15

and 16). The adult male and female harvest per county was determined by dividing the square miles of deer range per county into the adult harvest (Tables 19 and 20).

The computed harvest of adult males per square mile of deer range for the mainland in 1977 was .30 antlered bucks. This is more than in 1976 (.25). Dukes County increased from .59 to .71 adult bucks per square mile while Nantucket decreased from 2.32 to 1.75.

The adult female harvest reported on the mainland increased from .07 in 1976 to .08 adult does in 1977 harvested per square mile of deer range. Dukes County increased with .72 females reported in 1976 and .80 adult females reported in 1977. There was an increase of .17 adult does reported taken on Nantucket Island in 1976 with 1.56 adult females reported in 1976 and 1.72 adult does taken in 1977 (Table 20).

A summary of the total harvest of deer in Massachusetts (including shotgun, archery and muzzle loader harvest) per county per sex and the harvest of deer per square mile of deer range in Massachusetts for 1977 is presented in Table 21.

The statewide harvest of deer per square mile of deer range was .52 in 1977. Of the .52 deer, .37 were males and .15 were females. There was an increase of .07 deer per square mile from the 1976 harvest of .45 deer per square mile (Table 21).

Table 22 presents the percent frequency ratio of adult females to adult males from 1970 through 1977. The mainland deer herd appears to be in good shape in regard to the harvest of adult females to adult males (Table 22). On Martha's Vineyard, the adult harvest is 1.00:1.13 percent frequency (males to females).

There was a slight decrease in the Nantucket harvest. The adult male to adult female frequency rate was .67 in 1976 and changed to .98 in 1977 (Table 22). If this trend continues, the number of antlerless permits should be reduced.

Table 23 presents a summary by deer management unit of the shotgun deer harvest, the number of sportsmen's antlerless permits issued, the harvest per square mile of deer range for adult male and female deer and the percent frequency ratio of adult females to adult males for 1977. All indices (adult harvest per square mile of deer range, percent frequency adult male to adult female ratios and the male fawn harvest) suggest that the mainland deer herd is in good biological balance; i.e., no out of proportion harvest of any sex or age of deer herd. In Dukes County, the adult deer harvest is one adult male to an adult female. The Nantucket harvest of adult males to adult females shows that for every 100 adult males taken, 98 adult females are harvested.

Acknowledgment: For the past three years, Mr. Roger Smith of the Blue Hills Regional Vocational High School, Canton, Massachusetts has graciously programmed and assisted in the computer analysis of the deer harvest data. Although the development of the deer harvest computer programs are not yet complete, the output to date has helped significantly in the analysis of the deer harvest data. We thank him.

Table 1. Summary of the Number of Sportsmen's Antlerless Permits Issued, the Shotgun Deer Harvest per Deer Management Unit, the Sex of the Harvest, the Ranking Order of Importance as a Deer Producing Unit, and the Percent of the Harvest by Unit for 1977.

Unit	Number Antlerless Permits	Male	Female	Total	Rank	Percent of Total
Berkshire	1,300	720	252	972	1	34
Franklin	700	399	126	525	2	19
Hampden	400	188	68	256	3	9
Worcester	200	223	32	255	4	9
Hampshire	300	171	61	232	5	8
Martha's Vineyard***	600	99	93	192	6	7
Nantucket	400	92	91	183	7	6
Barnstable	200	88	37	125	8	4
Region II**	200	20	10	30	10	2
Region I*	200	49	11	60	9	2
	4,500	2,051	784	2,835		

* Region I includes Middlesex, Norfolk, Essex and Suffolk Counties.
** Region II includes Bristol and Plymouth Counties.
*** Gosnold's 22 males and 26 females included.

Table 2. A Summary of the Shotgun, Archery, Primitive Weapons, and Paraplegic Hunter Harvest by County for 1977 in Massachusetts.

County	Shotgun				Archery				Primitive Firearms				Totals				% of Total
	M	F	T	BB	M	F	T	BB	M	F	T	BB	M	F	T	BB	
Barnstable	88	37	125	9	6	2	8	0	0	1	1	0	94	40	134	9	4.3
Berkshire	720	252	972	46	28	5	33	8	10	20	30	5	758	277	1035	59	33.4
Bristol	5	2	7	0	0	0	0	0	0	0	0	0	5	2	7	0	0.2
Dukes*	77	67	144	28	2	0	2	1	1**	0**	1**	0	80	67	147	29	4.7
Essex	24	8	32	3	2	0	2	0	2	1	3	0	28	9	37	3	1.2
Franklin	399	126	525	29	22	10	32	4	25	24	49	7	446	160	606	40	19.5
Hampden	188	68	256	11	13	8	21	1	3	3	6	2	204	79	283	14	9.1
Hampshire	171	61	232	6	12	6	18	0	7	5	12	0	190	72	262	6	8.4
Middlesex	17	3	20	1	1	0	1	0	0	0	0	0	18	3	21	1	0.7
Nantucket	92	91	183	28	7	1	8	0	2	0	2	0	101	92	193	28	6.2
Norfolk	8	0	8	0	0	0	0	0	0	0	0	0	8	0	8	0	0.3
Plymouth	15	8	23	1	1	0	1	0	1	0	1	1	17	8	25	2	0.8
Suffolk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Worcester	223	32	255	10	9	7	16	1	14	11	25	2	246	50	296	13	9.5
Gosnold	22	26	48	9	0	0	0	0	0	0	0	0	22	26	48	9	1.5
No Town or County	2	3	5	-	-	-	-	-	-	-	-	-	2	3	5	-	Tr.
Totals	2051	784	2835	181	103	39	142	15	65	65	130	17	2219	888	3107	213	100.0

* Gosnold not includes

** Includes Paraplegic Hunt - None taken.

Table 3. County Summary of the 1977 Massachusetts Shotgun Deer Harvest by Sex and the County Rank in Order of Importance from 1972 through 1977.

County	Male	Female	Total	Rank 1977	Rank 1976	Rank 1975	Rank 1974	Rank 1973	Rank 1972
Barnstable	88	37	125	8	8	8	8	8	8
Berkshire	720	252	972	1	1	1	1	1	1
Bristol	5	2	7	13	12	12	11	12	12
Dukes*	77	67	144	7	5	6	5	3	3
Essex	24	8	32	9	11	10	9	9	9
Franklin	399	126	525	2	2	2	2	2	2
Hampden	188	68	256	3	3	3	3	5	4
Hampshire	171	61	232	5	7	5	6	7	6
Middlesex	17	3	20	11	10	11	12	11	11
Nantucket	92	91	183	6	4	7	7	6	7
Norfolk	8	0	8	12	12	13	13	13	13
Plymouth	15	8	23	10	9	9	10	10	10
Suffolk	0	0	0	14	13	14	13	13	13
Worcester	223	32	255	4	6	4	4	4	5
Subtotal	2029	758	2787						
Gosnold	22	26	48						
Total	2051	784	2835**						

* Gosnold not included
**Includes five (5) No Town Reported records

Table 4. A Summary of the 1977 Deer Shotgun Harvest per Sex per Management Unit

Unit	Males	Females	Total	Male Fawns
Berkshire	720	252	972	46
Franklin	399	126	525	29
Worcester	223	32	255	10
Hampshire	171	61	232	6
Hampden	188	68	256	11
Region I	49	11	60	4
Region II	20	10	30	1
Barnstable	88	37	125	9
Martha's Vineyard	77	67	144	28
Nantucket	92	91	183	28
Gosnold	22	26	48	9
Totals	2051	784	2835	181

Table 5. Number of Permits and Deer Harvest by Permittees, 1970 through 1977, in Massachusetts

	1970	1971	1972	1973	1974	1975	1976	1977
Permit Applications*	35,000	37,500	38,000	32,000	30,000	33,000	34,000	34,000
Mainland Permits	6,000	6,000	4,000	4,000	4,000	4,200	4,000	3,500
Adult Male	124	104	55	67	80	161	69	80
Male Fawn	183	175	136	102	148	125	125	117
Female	612	698	531	396	602	476	499	580
Totals	919	972	722	565	830	762	732	777
Farmer-Landowner Permits	347	270	326	349	358	370	343	397
Adult Male	25	20	14	19	38	21	10	16
Male Fawn	0	0	0	0	0	10	9	6
Female	34	26	42	37	42	40	39	46
Totals	59	46	56	56	80	71	58	68
Nantucket Permits	400	400	400	400	400	400	400	400
Adult Male	15	26	23	22	22	17	17	6
Male Fawn	24	29	17	29	26	27	29	28
Female	85	70	61	65	66	74	79	91
Totals	124	125	101	116	114	118	125	125
Martha's Vineyard Permits	0	600	600	637**	600	600	600	600
Adult Male	0	30	24	21	25	22	19	21
Male Fawn	1	41	37	35	29	34	29	28
Female	38	95	126	117	95	76	87	67
Totals	39	166	187	173	149	132	135	116
Total Permits Issued	6,747	7,270	7,326	5,386	5,358	5,565	5,343	4,897
Deer (Antlerless Only)	1,082	1,260	1,010	854	1,093	1,012	992	1,018
Deer (Both Sexes) All Permits	1,141	1,306	1,056	910	1,173	1,083	1,050	1,086

* Figure rounded.
** Includes Naushon Island

Table 6. A Summary of Massachusetts Deer Harvest per Farmer-Landowner Permit per County for the 1977 Shotgun Season

County	Number Issued	Male Fawns	Adult Males	Females	Total
Barnstable	1	0	0	0	0
Berkshire	91	2	5	12	19
Bristol	0	0	0	0	0
Dukes	0	0	0	0	0
Essex	1	0	0	1	0
Franklin	170	2	5	17	24
Hampden	33	1	1	5	7
Hampshire	59	1	2	4	7
Middlesex	0	0	0	0	0
Nantucket	0	0	0	0	0
Norfolk	0	0	0	0	0
Plymouth	0	0	0	0	0
Suffolk	0	0	0	0	0
Worcester	42	0	3	7	10
Totals	397	6	18	46	68

Table 7. A Summary of Massachusetts Deer Harvest per Sportsman's Antlerless Permit per Deer Management Unit and the Success Ratio of Antlerless Permit Holders for 1977.

Management Unit	No. of Permits Issued	No. of Deer Harvested by Antlerless Permit				Ratio of Deer per Antlerless Permit*				Total Deer	Success Ratio Deer:Antlerless Permit
		Button Buck	Adult Male	Total Male	Female	Button Buck	Adult Male	Total Male	Female		
Berkshire	1300	44	38	82	240	1:30	1:34	1:16	1:5	322	1:4
Franklin	700	27	23	50	109	1:26	1:30	1:14	1:6	159	1:4
Worcester	200	10	1	11	25	1:20	1:200	1:18	1:8	36	1:6
Hampshire	300	5	5	10	57	1:60	1:60	1:30	1:5	67	1:4
Hampden	400	10	7	17	63	1:40	1:57	1:24	1:6	80	1:5
Region I	200	4	2	6	11	1:50	1:100	1:33	1:18	18	1:11
Region II	200	1	1	2	10	1:200	1:200	1:100	1:20	12	1:17
Barnstable	200	9	2	11	37	1:22	1:100	1:18	1:5	48	1:4
Unknown			1	1							
	3500	119	80	199	626	1:29	1:44	1:18	1:6	825	1:4
Martha's Vineyard	600	28	21	49	67	1:21	1:29	1:12	1:9	116	1:5
Nantucket	400	28	6	34	91	1:14	1:67	1:12	1:4	125	1:3
Statewide	4500	175	107	282	738	1:25	1:42	1:16	1:6	1020	1:4

* Figures rounded.

Table 8. A Summary of Massachusetts Deer Mortalities Reported by Natural Resource Officers, 1 January - 31 December 1977

	January			February			March			April			May			June		
	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex	M.	F.	No Sex
Motor Vehicles	2	3		3	9	1	6	13	1	8	11	2	19	18	2	13	12	1
Dogs	3	11	1	6	21	1	3	5	1	1	5	1		1				1
Illegal Kill				3	1						1					1	2	
Drowned					1													
Fences							1											
Trains																		
Crop Damage and Others				1	2													
Unknown				1	2		3	1		1	1			2				
Subtotal	5	14	1	14	36	2	13	19	2	10	18	3	19	21	2	14	14	2
Total (Cum. Total)		20			52 (72)			34 (106)			31 (137)			42 (179)			30 (209)	

	July			August			September			October			November			December		
Motor Vehicles	2	8		7	14	5	10	20	2	25	28	5	40	24	5	9	13	1
Dogs							1			1				1		4	3	
Illegal Kill							1			3	3		5	8	3	14	11	2
Drowned																1		
Fences		1																
Trains																		
Crop Damage and Other					2			1			1			1				
Unknown							1			1	2		5	3		3	1	1
Subtotal	2	9		7	16	5	13	21	2	30	34	5	50	37	8	31	28	4
		11 (220)			28 (248)			36 (284)			69 (353)			95 (448)			63 (511)	

Cause	Male	Female	Unknown Sex	Total
Motor Vehicles	143	173	25	341
Dogs	19	49	5	73
Illegal Kill	28	24	5	57
Drowned	1	1		2
Fences	1	1		2
Trains				0
Crop Damage and Others	1	7		8
Unknown	15	12	1	28
Totals	208	267	36	511

Table 9. Five-Year Summary of Deer Mortalities of Massachusetts Deer Reported by Natural Resource Officers, 1972 through 1977

Cause	1972	1973	1974	1975	1976	1977	5-Yr. Avg.	Previous 5-Yr. Total
Motor Vehicles	321	321	347	362	296	341	330	1650
Dogs	41	36	33	60	58	73	46	228
Illegal Kills	44	23	35	25	48	53	35	175
Crop Damage	1	2	1	0	1	0	1	5
Unknown Causes	35	21	33	29	29	28	29	147
All Other Causes	11	15	18	32	10	16	17	86
	453	418	469	508	442	511	458	2292

Table 10. A Comparison of Total Non-Hunting Deer Mortalities of Massachusetts Deer from 1971 through 1977

	1971	1972	1973	1974	1975	1976	1977
No. of Deer	694	453	420	469	508	442	511
Percent Change		-34.7%	-7.3%	+11.66%	+8.32%	-13%	+15.61%

Table 11. Comparison of Actual Numbers of Deer Mortalities by Sex* and Adjusted Data for Massachusetts Deer per Month, 1977

Month	Male	Female	Unknown Sex	Total	Adjusted Male	Adjusted Female
January	5	14	1	20	5	15
February	14	36	2	52	15	37
March	13	19	2	34	14	20
April	10	18	3	31	11	20
May	19	21	2	42	20	22
June	14	14	2	30	15	15
July	2	9		11	2	10
August	7	16	5	28	9	19
September	13	21	2	36	14	22
October	30	34	5	69	32	37
November	50	37	8	95	54	41
December	31	28	4	63	33	30
	208	267	36	511	224	287

Adjusted Sex Ratio

100 Males : 128 Females
80 Males : 100 Females
44% Males : 56% Females

Table 12. The Massachusetts Non-Hunting Deer Mortalities Ranked by County, 1971 through 1977

County	1971		1972		1973		1974		1975		1976		1977	
	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank
Barnstable	93	2	72	2	76	2	56	3	54	3	49	4	42	6
Berkshire	175	1	92	1	109	1	148	1	203	1	112	1	154	1
Bristol	6	11	6	11	6	9	6	11	5	10	7	10	3	12
Essex	25	9	20	9	20	6	23	7	24	7	19	8	29	8
Franklin	90	3	66	3	73	3	62	2	58	2	61	2	50	4
Hampden	51	6	45	5	28	5	19	9	28	6	31	6	33	7
Hampshire	65	5	38	6	28	5	37	5	30	5	29	7	46	5
Middlesex	18	10	8	10	14	8	13	10	12	8	10	9	12	9
Norfolk	1	13	6	10	3	10	4	12	2	11	2	12	4	11
Plymouth	36	8	21	8	17	7	20	8	11	9	19	8	11	10
Suffolk	0	14	0	14	0	14	0	13	0	12	0	12	0	14
Worcester	99	3	55	4	37	4	42	4	30	5	37	5	54	3
Dukes	17	9	22	7	6	9	24	6	5	10	6	11	2	13
Nantucket	11	10	2	12	3	10	13	10	48	4	60	3	69	2
Unknown													2	13

Table 13. Age Composition of Mainland Massachusetts Male Deer Checked at Biological Stations, 1969 through 1977

Age	1969	1970	1971	1972	1973	1974	1975	1976	1977
6 mos.	67	121	100	77	69	73	80	61	53
1-1/2	229	263	211	260	237	255	303	222	287
2-1/2	133	147	103	144	173	156	151	159	183
3-1/2	98	97	77	96	90	86	97	107	104
4-1/2	55	59	43	46	47	35	36	43	49
5-1/2	21	21	19	14	18	11	9	10	12
6-1/2	14	7	3	11	7	5	12	2	12
7-1/2	2	7	6	2	6	4	5	2	1
8 to 9-1/2	2	1	1	0	3	0	2	3	2
10-1/2	1	0	0	0	0	0	0	0	0
Totals	652	723	563	563	650	730	695	609	703

Table 14: Age Composition of Mainland Massachusetts Female Deer Checked at Biological Stations from 1969 through 1977

Age	1969	1970	1971	1972	1973	1974	1975	1976	1977
6 mos.	76	90	101	90	62	62	71	38	63
1-1/2	55	54	64	57	48	53	50	41	45
2-1/2	55	69	69	56	42	51	42	43	39
3-1/2	36	46	51	51	35	33	33	26	42
4-1/2	24	29	33	22	25	23	15	14	13
5-1/2	11	14	20	14	6	8	10	11	10
6-1/2	0	8	14	10	5	7	4	8	4
7-1/2	2	0	11	2	6	6	3	1	2
8 to 9-1/2	0	0	9	0	2	3	2	4	1
10-1/2	0	0	0	1	0	1	1	0	0
Totals	259	310	372	303	231	247	231	186	219

Table 15. Age Composition of Martha's Vineyard, Massachusetts Deer Checked at Biological Stations from 1972 through 1977

	Males						Females					
Age	1972	1973	1974	1975	1976	1977	1972	1973	1974	1975	1976	1977
6 mos.	25	30	27	32	24	24	30	24	32	22	32	15
1-1/2	41	25	32	30	26	24	24	21	21	13	10	19
2-1/2	15	17	9	6	7	14	11	17	12	13	22	10
3-1/2	15	12	19	7	9	4	15	13	9	13	10	9
4-1/2	6	7	5	4	1	1	9	8	5	5	4	2
5-1/2	1	3	1	3	1	0	6	2	5	1	1	5
6-1/2	3	0	0	0	0	0	1	1	2	3	0	0
7-1/2	2	0	1	0	0	0	2	1	0	1	0	0
8 to 9-1/2	0	0	0	0	0	0	1	1	0	0	0	0
10-1/2	0	0	0	0	0	0	0	0	1	0	0	0
Totals	108	94	94	82	68	67	99	88	87	71	79	60

Table 16. Age Composition of Nantucket, Massachusetts Deer Checked at Biological Stations from 1972 through 1977

	Males						Females					
Age	1972	1973	1974	1975	1976	1977	1972	1973	1974	1975	1976	1977
6 mos.	17	22	25	27	26	26	21	21	20	26	23	26
1-1/2	19	28	31	28	35	35	16	17	21	23	20	32
2-1/2	12	19	15	14	16	15	12	8	10	7	6	9
3-1/2	12	11	12	11	7	5	5	7	1	6	7	9
4-1/2	0	4	2	4	5	4	5	9	6	6	6	5
5-1/2	3	2	1	0	0	3	0	2	2	1	5	1
6-1/2	0	1	0	0	0	0	1	0	1	2	0	1
7-1/2	0	0	0	0	0	0	1	1	0	1	0	2
8 to 9-1/2	0	0	0	0	0	0	0	0	0	0	0	0
10-1/2	0	0	0	5	0	0	0	0	0	2	0	0
Totals	63	86	86	89	89	88	61	65	61	74	67	85

Table 17. A Summary of the Massachusetts Shotgun Deer Harvest, 1968 through 1977

Year	All Males	Adult Males	Button Bucks	All Females	Adult Females	Fawn Females	Total Deer	Total Permits Issued	Button Bucks and Females	% of Total Deer
1968	1083	1022	61	310	217	93	1393	2331	371	27
1969	1424	1299	125	586	415	171	2010	5295	711	35
1970	1598	1378	220	769	546	223	2367	7347	989	42
1971	1359	1106	253	889	643	246	2248	7270	1142	51
1972	1455	1256	199	760	530	230	2215	5326	959	43
1973	1421	1258	163	616	444	172	2037	5386	779	38
1974	1878	1665	213	791	563	228	2669	5358	1004	38
1975	1691	1492	199	700	478	222	2391	5370	899	38
1976	1812	1620	192	722	519	203	2534	5343	914	36
1977	2051	1870	181	784	558	226	2835	4897	965	34

Table 18. A Summary of Percentage Change in Adult Harvest and Calculated Minimal Populations of Deer in Massachusetts, 1969 through 1977 (based on the shotgun season)

	1969	Percent Change 1969-1970	1970	Percent Change 1970-1971	1971	Percent Change 1971-1972	1972	Percent Change 1972-1973
Adult male harvest	1,299	+ 6.08	1,378	- 19.73	1,106	+ 13.56	1,256	+ 00.02
Calculated adult male population	3,180	- 00.82	3,154	- 27.68	2,281	+ 20.78	2,755	+ 11.80
Calculated adult female population	4,007	+ 32.24	5,299	- 22.95	4,083	- 3.67	3,933	- 02.11
Calculated minimal population	11,805	+ 27.18	15,014	- 22.93	11,571	- 2.03	11,336	+ 00.83

	1973	Percent Change 1973-1974	1974	Percent Change 1974-1975	1975	Percent Change 1975-1976	1976	Percent Change 1976-1977	1977
Adult male harvest	1,258	+ 32.35	1,665	- 11.60	1,492	+ 8.36	1,620	+ 15.43	1,870
Calculated adult male population	3,080	+ 00.86	3,107	- 03.40	3,005	+ 24.75	3,749	+ 8.82	4,080
Calculated adult female population	3,850	+ 21.03	4,660	- 10.30	4,206	+ 22.32	5,145	- 7.13	4,778
Calculated minimal population	11,431	+ 13.59	12,984	- 08.00	11,975	+ 24.39	14,896	- 5.66	14,053

Table 19. Summary of the Adult Male Deer Harvest per Square Mile of Deer Range per County in Massachusetts, 1972 through 1977 (shotgun season)

County	Sq. Mi. Deer Range	1972	1973	1974	1975	1976	1977
Barnstable	267.3	.28	.28	.31	.27	.15	.29
Berkshire	811.8	.47	.53	.85	.74	.80	.83
Bristol	388.8	.003	.003	.01	.01	.002	.01
Essex	302.4	.06	.06	.05	.05	.05	.08
Franklin	621.0	.45	.34	.51	.44	.52	.59
Hampden	468.7	.28	.31	.35	.34	.43	.38
Hampshire	428.8	.23	.23	.27	.34	.24	.38
Middlesex	521.9	.01	.01	.003	.01	.01	.03
Norfolk	274.2	-	-	-	.004	.004	.03
Plymouth	743.0	.02	.01	.01	.03	.05	.03
Worcester	1,226.0	.10	.10	.11	.12	.08	.17
	5,783.9	.19	.19	.27	.25	.25	.30
Dukes*	87.4	1.16	1.00	.84	.70	.59	.71
Nantucket	36.6	1.34	1.86	1.69	1.99	2.32	1.75

*Gosnold not included.

Table 20. Summary of the Adult Female Deer Harvest per Square Mile of Deer Range per County in Massachusetts, 1972 through 1977 (shotgun season)

County	Sq. Mi. Deer Range	1972	1973	1974	1975	1976	1977
Barnstable	267.3	.10	.06	.12	.04	.07	.10
Berkshire	811.8	.13	.13	.27	.20	.22	.22
Bristol	388.8	.003	.003	.003	.00	.003	.003
Essex	302.4	.003	.00	.01	.01	.01	.03
Franklin	621.6	.23	.13	.13	.14	.15	.14
Hampden	468.7	.08	.07	.07	.09	.08	.10
Hampshire	428.8	.08	.05	.07	.06	.05	.10
Middlesex	521.9	.01	.002	.002	.01	.006	.003
Norfolk	274.2	.00	.00	.00	.004	.004	.00
Plymouth	743.0	.00	.004	.004	.02	.008	.01
Worcester	1,226.0	.03	.04	.04	.04	.03	.02
Mainland	5,783.9	.08	.05	.08	.07	.07	.08
Dukes*	87.4	.88	1.00	.67	.63	.72	.80
Nantucket	36.6	1.09	1.20	1.20	1.39	1.56	1.72

*Gosnold not included.

Table 21. A Summary of the Total Harvest of Deer in Massachusetts (including shotgun, archery, and muzzle load harvests) per County per Sex and the Harvest of Deer per Square Mile of Deer Range in Massachusetts for 1977.

County	Males	Females	Total	Sq. Mi. of Deer Range	Males per Sq. Mi.	Females Per Sq. Mi.	Total Deer Per Sq. Mi.
Barnstable	94	40	134	267.3	.35	.14	.50
Berkshire	758	277	1035	811.8	.94	.34	1.28
Bristol	5	2	7	388.8	.01	.01	.02
Essex	28	9	37	302.4	.09	.03	.12
Franklin	446	160	606	621.6	.72	.26	.97
Hampden	204	79	283	468.7	.44	.17	.60
Hampshire	190	72	262	428.8	.44	.17	.61
Middlesex	18	3	21	521.9	.03	.006	.04
Norfolk	8	0	8	274.2	.00	.03	.03
Plymouth	17	8	25	473.0	.04	.02	.05
Worcester	246	50	296	1226.0	.20	.04	.24
Total	2040	730	2770	5783.9	.35	.12	.48
Dukes*	80	67	147	87.4	.92	.77	1.68
Nantucket	101	92	193	36.6	2.76	2.51	5.27
Totals	2197	862	3059	5907.9	.37	.15	.52

*Gosnold not included (22 males, 26 females)

Table 22. Percent Frequency Ratio of Adult Females to Adult Males, 1970 through 1977 (shotgun season).

County	1970 Adult Male	1970 Adult Female	1970 % Freq.	1971 Adult Male	1971 Adult Female	1971 % Freq.	1972 Adult Male	1972 Adult Female	1972 % Freq.	1973 Adult Male	1973 Adult Female	1973 % Freq.
Barnstable	80	29	.36	82	25	.30	75	27	.36	77	15	.19
Berkshire	366	138	.38	352	187	.53	373	112	.30	424	109	.26
Bristol	4			1			3	1	.33			
Essex	20	9	.45	12	1	.08	16	1	.06	16	4	.25
Franklin	251	98	.39	232	176	.76	277	141	.51	213	79	.37
Hampden	117	31	.26	103	42	.41	131	38	.29	145	36	.25
Hampshire	114	48	.42	63	31	.49	98	34	.35	101	22	.22
Middlesex	9	6	.67	14	7	.50	3	4	1.33	4	1	.25
Norfolk		1										
Plymouth	8	4	.50	7	1	.14	12	0	.00	5	2	.40
Suffolk												
Worcester	192	88	.46	89	60	.67	117	44	.38	119	51	.43
Total	1,161	452	.39	955	530	.55	1,105	402	.36	1,104	316	.29
No. of Sportsmen Permits		6,000			6,000			4,000			4,000	
Dukes	79	31	.39	87	58	.67	102	77	.75	86	87	1.01
No. of Sportsmen Permits					600			600			600	
Nantucket	87	60	.69	64	55	.86	49	40	.82	68	44	.69
No. of Sportsmen Permits		400			400			400			400	
Total Number of Permits*		6,747			7,270			5,326			5,349	

* Includes Farmer-Landowner Permits

Table 22. (Continued)

County	1974 Adult Male	1974 Adult Female	1974 % Freq.	1975 Adult Male	1975 Adult Female	1975 % Freq.	1976 Adult Male	1976 Adult Female	1976 % Freq.	1977 Adult Male	1977 Adult Female	1977 % Freq.
Barnstable	85	31	.36	72	11	.15	41	18	.44	79	26	.33
Berkshire	689	216	.31	601	163	.27	651	176	.27	674	179	.27
Bristol	4	1	.25	5			2	1	.50	5	1	.20
Essex	13	3	.23	14	4	.29	14	3	.21	21	7	.33
Franklin	316	76	.24	275	90	.33	320	91	.28	370	90	.24
Hampden	160	37	.23	161	42	.26	202	37	.18	177	48	.27
Hampshire	116	32	.28	146	25	.17	103	20	.19	165	43	.26
Middlesex	2	1	.50	4	3	.75	5	3	.60	16	2	.12
Norfolk				1	1	1.00	1	1	1.00	8	0	.0
Plymouth	6	2	.33	16	8	.50	22	4	.18	14	6	.43
Suffolk												
Worcester	133	52	.39	144	44	.31	103	34	.33	213	223	.11
Totals	1,524	451	.30	1,439	391	.27	1,464	388	.25	1,742	445	.26
No. of Sportsmen Permits		4,000			4,200			4,000			3,500	
Dukes	73	60	.82	61	55	.90	71	63	.89	62	70	1.13
No. of Sportsmen Permits		600			600			600			600	
Nantucket	64	44	.69	73	51	.70	85	57	.67	64	63	.98
No. of Sportsmen Permits		400			400			400			400	
Total Number of Permits*		5,358			5,570			5,350			4,897	

* Includes Farmer-Landowner Permits

Table 23. A Summary of the Shotgun Deer Harvest per Deer Management Unit, the Number of Sportsman Antlerless Permits per Unit, the Square Miles of Deer Range, the Adult Harvest per Unit and the Percent Frequency Ratio of Adult Females to Adult Males for 1977.

Unit	No. of Sportsman Permits	Male		Female		Total Deer Harvest	Sq. Mi. of Deer Range	Adult Male/ Sq. Mi.	Adult Female/ Sq. Mi.	Percent Frequency Adult Female to Adult Male
		Adult	Fawns	Adult	Fawns*					
Barnstable	200	79	9	26	11	125	267.3	.29	.10	.33
Berkshire	1300	674	46	179	73	972	811.8	.83	.22	.27
Franklin	700	370	29	90	36	525	621.6	.59	.14	.24
Hampden	400	177	11	48	20	256	468.7	.38	.10	.27
Hampshire	300	165	6	43	18	232	423.8	.38	.10	.26
Worcester	200	213	10	23	9	255	1226.0	.17	.02	.11
Region I**	200	45	4	9	2	60	1093.5	.04	.008	.02
Region II***	200	19	1	7	3	30	861.8	.02	.008	.36
Dukes****	600	62	37	70	23	192	87.4	.71	.80	1.13
Nantucket	400	64	28	63	28	183	36.6	1.75	1.72	.98
Totals	4500	1870	181	558	226	2835	5907.9	.32	.09	.30

* Female fawns were calculated using the percent of fawns reported at biological deer checking stations.
** Region I includes Essex, Middlesex and Norfolk Counties.
*** Region II includes Bristol and Plymouth Counties.
**** Includes Gosnold.

Job II-5 White-Tailed Deer Wintering Sites in Massachusetts

Job Objective: To determine the location of the deer wintering in Massachusetts.

Summary: Project personnel interviewed Natural Resource Officers, Division personnel and others in an effort to locate deer wintering sites. Specific locations marked on a map are of far more value than a general description. A grid system adaptable for a computer program was developed for specific deer wintering sites. Project personnel investigated deer wintering sites in New York and Connecticut.

The investigations conducted to date are of a preliminary nature to determine methods and techniques to be used to determine the objective.

Target Date: 1 July 1979.

Progress: On schedule.

Recommendations: Continue this job.

Cost: $8,000

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Job II-6 White-Tailed Deer Wintering Sites in Massachusetts

Job Objective: Evaluate deer wintering sites in Massachusetts.

Summary: This job was inactive during the period covered by this report.

Progress: Inactive.

Deviations:N None.

Recommendations: Continue this job.

Cost: None.

Remarks: None.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by _____
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Date _____

HA35. EA 32.3: W-35-R-20/III-1

PERFORMANCE REPORT

State: Massachusetts Project Number: W-35-R-20

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Surveys

Period Covered: 1 June 1977 to 31 May 1978

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Work Plan III Census of Game Species

Plan Objectives: To determine trends in Massachusetts populations of mourning dove, bobwhite quail, and woodcock.

Job III-1. Mourning Dove Census

Job Objective: To obtain an index of the spring breeding population of mourning doves.

Summary: Calling doves were counted on three randomized routes in cooperation with the U. S. Fish and Wildlife Services annual mourning dove breeding population census. The total number of calling doves increased 35 percent from 1976 to 1977.

Target Date 31 May 1979

Progress: On schedule

Deviations: None

Recommendations: Continue the spring mourning dove census in cooperation with the U. S. Fish & Wildlife Service.

Cost: $76.82 (Project leader man-days: 1/2)

Remarks: Procedures: In accordance with instructions from the U. S. Fish and Wildlife Service, doves were censused by roadside coo-count between 24 and 28 May on the three randomized routes established in 1967. Division personnel conducted two routes and a Fish and Wildlife Service cooperator conducted a third route.

Findings: Results of the 1977 call count of mourning doves are compared with previous year's data in Table 1.

The total number of calling doves on three routes combined increased 35 percent over 1976 counts. Route 8 increased from 11 to 13 doves heard, route 8A increased from one to seven doves, and route 10 decreased from five to three doves.

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Table 1. Doves heard on comparable Massachusetts routes: 1967 to 1977

	DOVES HEARD										
ROUTE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
8	26	11	2	11	10	12	10	0	19	11	13
8A*	11	1	1	2	1	2	2	2	6	1	7
10(12)	7	0	1	3	1	2	4	4	**	5	3
Totals	44	12	4	16	12	16	16	6	25	17	23
Mean	14.7	4.0	1.3	5.3	4.0	5.3	5.3	2.0	12.5	5.7	7.7

	Percent 1977 counts ± from									
ROUTE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
8	-50	+18	+550	+18	+30	+8	+30	+1300	-32	+18
8A	-36	+600	+600	+250	+600	+250	+250	+250	+17	+600
10	-57	+300	+200	0	+200	+50	-25	-25	--	-40
Totals	-48	+92	+475	+44	+92	+44	+44	+283	-20	+35

* Route relocated 1974
** Route conducted; data not retained.

The weighted mean number of doves heard per comparable Massachusetts route was 16.8 in 1976 and 19.0 in 1977 (Dolton 1977). Dove populations in the Eastern Management Unit increased 9.4 percent over 1976 and 7.4 percent over a ten-year mean. Linear regression analyses indicates a non-significant decrease in Eastern Unit dove populations.

Acknowledgements: I acknowledge the cooperation of Refuge Manager Linda K. Gintoli of Great Meadows National Wildlife Refuge, who conducted the survey on Route 8.

References Cited: Dolton, D. D. 1977. Mourning dove breeding population status. U. S. Fish & Wildlife Service, Laurel, Md., Admin. rept., 36 pp

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by_____
James E. Cardoza
Game Biologist

Date _____

W-35-R-20/III-2

PERFORMANCE REPORT

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STATE: MASSACHUSETTS

Project No.: W-35-R-20

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Inventory

Period Covered: 1 June 1977 to 31 May 1978

Work Plan III: Census of Game Species

Objectives: To determine trends in Massachusetts populations of mourning doves, bobwhite quail, and woodcock.

Job III-2: Spring Quail Census

Objective: To determine the dynamic aspects of quail population densities and distribution.

Summary: The 1977 spring quail census for Barnstable, Bristol, and Plymouth Counties showed no significant change as compared to either 1975 indices or a four-year mean index.

Target Date: 31 May 1979

Progress: On schedule

Significant Deviations: None

Recommendations:

1. Continue the spring quail census in 1978 using at least five routes per county. These routes should be comparable to those surveyed in 1977.

2. Norton et al (1961) indicated that whistling-cock indices may be poor indicators of fall population size or hunter success. They suggested that refinement was necessary to increase the reliability and usefulness of whistle counts.

   Robel et al (1969) studied factors affecting the calling rate of bobwhites. Results of these studies indicated that male quail population, day of year, time of day, wind velocity, temperature, and relative humidity were the most group evaluation factors influencing quail whistling. They suggest that by reducing the variation in the above environmental and time factors, quail call indices can be useful as a management aid as an index to spring breeding populations.

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3. In Massachusetts, the variable of male quail population is partially controlled by using the same routes (with identical beginning and ending points and intermediate stops) each count year. Counts are conducted as nearly as possible within the same two-week time period and as nearly as possible within the same early-morning time period each day of the count. Temperature variations are reduced by applying correction factors which weight call indices according to the effects of temperature outside a standard (62-68°) range. Wind and humidity variables are partially controlled by conducting whistle counts only under certain limited conditions of wind velocity and precipitation.

   In the future, whistle counts in Massachusetts should continue to be conducted under as nearly identical conditions as possible. Adjustment of calling rates for environmental variable may be refined [as suggested by Robel et al (1969)] by establishing regional permanent stations to which to relate counts from call-index routes.

4. Another condition affecting quail index counts in Massachusetts is the amounts of background noise. Three of the 16 routes surveyed in 1977 had to be re-run at least once due to the excessive noise which obscured quail whistles. One new route was deemed unusable due to traffic noise. Future counts should be conducted, insofar as possible, on days when background noises are lightest. Consistently noisy routes may have to be dropped or relocated.

5. Collection of quail wings (Rosene 1969: 45-53) would enable the Division to estimate the age composition of the population. Specimens would have to be collected throughout quail range and would have to emphasize privately-owned land, since management areas are stocked so samples for these areas would not necessarily reflect changes in wild populations.

Cost: $742.46 (project leader man-days 2-1/2)

Remarks: Procedures: Roadside whistle counts were conducted during the first three weeks of July 1977 following established procedures and routes (W-25-R). The resultant call indices were corrected for temperature variations (Bennitt 1951; Ripley 1956) and tabulated and analyzed on a county basis. Counts for all counties were compared with the previous year's indices and with a four-year (1969, 1971, 1973, 1975) index. Changes in annual counts were analyzed for statistical significance with a one-sided t-test and the results reported accordingly by counties.

Findings: The 1977 weighted call indices as compared to those from 1975 and the four-year average are shown in Table 1. Computations of the tests of significance and comparisons of the indices by county and route are shown in Tables 2, 3, and 4.

A total of 16 routes were conducted in 1977, of which six were in Plymouth county, five in Bristol county, and five in Barnstable county. Routes comparable with 1975 included four in Plymouth, four in Bristol, and three in Barnstable.

The 1977 indices were higher than those from 1975 in Barnstable and Plymouth counties and lower than 1975 in Bristol county. None of these changes were statistically significant at the 95 percent level. The 1977 indices were lower than the four-year index in all three counties. These changes also were not statistically significant.

Considerably habitat loss has occurred in southeastern Massachusetts in the past few decades (Table 5). The amount of agricultural and open land has decreased in four of the five counties open to quail hunting (MacConnell 1975). The apparent increase in open land in Nantucket is misleading, since "heath" was classified as forest in 1951, but open land in 1971. Though this reclassification masks the degree of change, agricultural and open land probably did decline on Nantucket from 1951 to 1971. This habitat loss, coupled with an unmeasured but increasing trend in posted land, has probably resulted in a decrease in the number of quail available to the hunter. Analyses of fluctuations in quail populations are therefore necessary in order to relate exploitation of this resource to other environmental stresses.

Table 1. County comparative call indices of Massachusetts quail populations, 1958-61 to 1977

County	Average 1958-61 Index	1964 Index	1967 Index	1969 Index	1971 Index	1973 Index	1975 Index	Average 1969 - 1975 Index	1977 Index	Significant Change 1969-75 to 1977	1975 to 1977
Barnstable	2.65	1.55	1.90	3.31	4.51	2.38	1.38	3.00	1.96	No	No
Bristol	0.71	0.91	0.96	0.95	2.21	1.52	1.16	1.32	0.72	No	No
Plymouth	1.84	1.34	1.83	2.49	2.02	1.56	0.81	1.72	1.49	No	No

Table 2. Analysis of differences in call indices, Barnstable County, 1975 and 1977

Route No.	Call Indices 1975	Call Indices 1977	D	D-$\bar{d}$	$(D-\bar{d})^2$
16B	120	347	227	142.33	20,257.83
18A	84	123	39	-45.67	2,085.75
23	129	117	12	-72.67	5,280.93
	333	587			27,624.51
	$\bar{x}$ = 111.00	$\bar{x}$ = 195.67			n-1 = 2

$\bar{d}$ = 84.67

$SD^2 = \frac{27,624.51}{2} = 13,812.26$

$S\bar{d}^2 = \frac{13,812.26}{3} = 4,604.08$

$S\bar{d} = \sqrt{4,604.08} = 67.85$

$t = \frac{84.67}{67.85} = 1.248$

t .05 (2 d. f.) = 2.920

Table 2 (cont.). Analysis of differences in call indices, Barnstable County, 1977 and four-year mean.

Route No.	Call Indices 1969-75	Call Indices 1977	D	D-$\bar{d}$	$(D-\bar{d})^2$
16B	225	347	122	17.67	312.23
18A	436	123	313	208.67	43,543.17
23	239	117	122	17.67	312.23
	900	587			44,167.63
	$\bar{x}$ = 300.00	$\bar{x}$ = 195.67			n-1 = 2

$\bar{d}$ = 104.33

$SD^2 = \frac{44,167.63}{2} = 22,083.82$

$S\bar{d}^2 = \frac{22,083.82}{3} = 7,361.27$

$S\bar{d} = \sqrt{7,361.27} = 85.80$

$t = \frac{104.33}{85.80} = 1.216$

t.05 (2 d. f.) = 2.920

Table 3. Analysis of differences in call indices, Bristol County, 1975 and 1977

Route No.	Call Indices 1975	Call Indices 1977	D	D-$\bar{d}$	(D-$\bar{d}$)^2
9A	275	71	204	160.5	25,760.25
15	53	64	11	32.5	1,056.25
35	43	84	41	-2.5	6.25
36	92	70	22	-21.5	462.25
	463	289			27,285.00

$\bar{x}$ = 115.75 $\bar{x}$ = 72.25 n-1 = 3

$\bar{d}$ = 43.50

$SD^2 = \frac{27,285}{3} = 9,095.00$ $S\bar{d} = \sqrt{2,273.75} = 47.68$

$S\bar{d}^2 = \frac{9,095.00}{4} = 2,273.75$ $t = \frac{43.50}{47.68} = 0.912$

$t_{.05}$ (3 d.f.) = 2.353

Table 3. (Cont.) Analysis of differences in call indices, Bristol County, 1977 and four-year mean.

Route No.	Call Indices 1969-1975	Call Indices 1977	D	D-$\bar{d}$	(D-$\bar{d}$)^2
9A	161	71	90	30.67	940.65
15	156	64	92	32.67	1,067.33
35	80	84	4	55.33	3,061.41
	397	219			5,069.39

$\bar{x}$ = 132.33 $\bar{x}$ = 73.00 n-1 = 2

$\bar{d}$ = 59.33

$SD^2 = \frac{5,069.39}{2} = 2,534.70$ $S\bar{d} = \sqrt{844.90} = 29.07$

$S\bar{d}^2 = \frac{2,534.70}{3} = 844.90$ $t = \frac{59.33}{29.07} = 2.041$

$t_{.05}$ (2 d.f.) = 2.920

Table 4. Analysis of differences in call indices, Plymouth County, 1975 and 1977.

Route No.	Call Indices 1975	Call Indices 1977	D	$D-\bar{d}$	$(D-\bar{d})^2$
5	65	28	37	-30.75	945.56
6A	31	62	31	-36.75	1,350.56
12	153	248	95	27.25	742.56
13A	75	257	182	114.25	13,053.06
	324	595			16,091.74

$\bar{x}$ = 81.00 $\bar{x}$ = 148.75 n - 1 = 3

$\bar{d}$ = 67.75

$SD^2 = \frac{16,091.74}{3} = 5,363.91$

$S\bar{d}^2 = \frac{5,363.91}{4} = 1,340.98$

$S\bar{d} = \sqrt{1,340.98} = 36.62$

$t = \frac{67.75}{36.62} = 1.850$

t.05 (3 d.f.) = 2.353

Table 4. (cont.) Analysis of differences in Call Indices, Plymouth County, 1977 and four-year mean.

Route No.	Call Indices 1969-1975	Call Indices 1977	D	$D-\bar{d}$	$(D-\bar{d})^2$
5	122	28	94	71	5,041
6A	173	62	111	88	7,744
12	254	248	6	17	289
13A	138	257	119	96	9,216
	687	595			22,290

$\bar{x}$ = 171.75 $\bar{x}$ = 148.75 n-1 =3

$\bar{d}$ = 23.00

$SD^2 = \frac{22,290}{3} = 7,430$

$S\bar{d}^2 = \frac{7,430}{4} = 1,857.50$

$S\bar{d} = \sqrt{1,857.50} = 43.10$

$t = \frac{23.00}{43.10} = 0.534$

t.05 (3 d.f.) = 2.353

Table 5. Changes in agricultural and open land in five counties of Massachusetts, 1951 - 1971.

County	Acres 1951	Acres 1971	Percent Change
Barnstable	42,257	22,754	-46.2
Bristol	73,701	56,134	-23.8
Dukes	14,892	9,991	-32.9
Nantucket	8,102	12,730	+57.1
Plymouth	72,151	49,910	-30.8

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MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved:_____
Richard Cronin, Superintendent

Prepared by:_____
James E. Cardoza
Game Biologist

Date _____

PERFORMANCE REPORT

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State: Massachusetts Project No. W-35-R-20

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Surveys

Period Covered: 1 June 1977 to 31 May 1978

Work Plan IV Wild Turkey Restoration Study

Work Plan Objective: To re-establish the wild turkey in the Commonwealth in sufficient numbers to allow for recreational hunting.

Job IV-1 Experimental Turkey Stocking

Job Objective: To re-establish the wild turkey in the Commonwealth in sufficient numbers to allow for recreational hunting.

Summary: Turkey populations in the southern Berkshires remain concentrated around the Beartown State Forest area, but dispersal continues to occur at a good rate, except to the east. Turkeys continue to be reported in northern Berkshire and Franklin counties, probably as a result of influx from neighboring states.

Target Date: 31 May 1979

Status of Progress: On schedule.

Deviations: None.

Recommendations:

1. Continue evaluation of the status and dispersal of the turkeys in western Massachusetts. Institute standardized spring gobbler routes as an index to breeding status. Quantify site characteristics (slope, exposure, vegetation, wet areas) at the location of turkey/turkey track reports to assist in predicting and evaluating potential distribution.

2. Investigate potential release sites in central and west central Massachusetts. Consider a trap-and-transplant release to one of these sites in 1978-79.

3. Request legislation amending or revising Section 75 of Chapter 131, which established a closed season on turkeys. Regulatory control should be returned to the Fisheries and Wildlife Board as a first step in permitting an open season on turkeys.

Cost: $1,849.16 (project leader man days: 18)

Publication approved by Alfred C. Holland, State Purchasing Agent #5146

Remarks:

Procedures: Turkey abundance was indexed by roadside counts, track counts, and cooperator reports. Snowmobiles were used during the winter to provide access to the areas.

Findings: Turkeys continue to disperse from the area of the Beartown release sites, with birds reported from several towns in southern Berkshire county. Dispersal is slowest to the east and northeast, possibly as a reflection of increased elevation and poorer winter habitat. Towns (statewide) in which turkeys were reported during 1977-78 are plotted in Figure 1.

A brood with several poults was observed on the east side of Three-Mile Hill in summer 1977 and a hen with two poults was seen nearby off Monument Valley Road in Great Barrington in August 1977. Cooperators reported a hen and 15 poults near the Mt. Wilcox Fire Tower in Beartown Forest in early July 1977. Another report from the same area later that month placed the number of poults at ten.

Winter searches again disclosed a concentration of turkeys along the southwest slope of Three-Mile Hill in Great Barrington between Fountain Pond and Blue Hill Road. Division personnel observed 21 turkeys and counted tracks of four more in this area in late February. Cooperators related an unverified observation of 41 birds seen there in early March and another second-hand report claimed a record of 50 turkeys crossing Monument Valley Road, just east of Three-Mile Hill, in mid-March.

Tracks of about four turkeys were again located near Konkapot Brook in Stockbridge, adjacent to Beartown Forest, and two birds were reported near Monument Valley Regional School in mid-February. Four turkeys were seen by Division personnel in early February in the beaver flowages near the old CCC Camp in Beartown. One of these birds, a young hen, was captured by hand and died soon afterwards. The bird was very emaciated and was found to have the tips of its wing, base of the tail, and area of the vent heavily fouled with burdock seed heads. Upon back-tracking, we located a large patch of burdock 0.2 km north, with the area in and around the patch heavily tracked up by turkeys.

Forest personnel observed two to four adult turkeys and about 12 poults on Beartown Road in Monterey in August 1977. Two foxes, with kits nearby, reportedly darted out and took 2-3 poults. Tracks of about seven turkeys, probably some of the same as seen in August, were found further north on Beartown Road, near East Brook, in February 1978. Two turkeys were also seen during deer week 1977 off Fairview Road in Monterey.

MASSACHUSETTS

CITY AND TOWN LINES

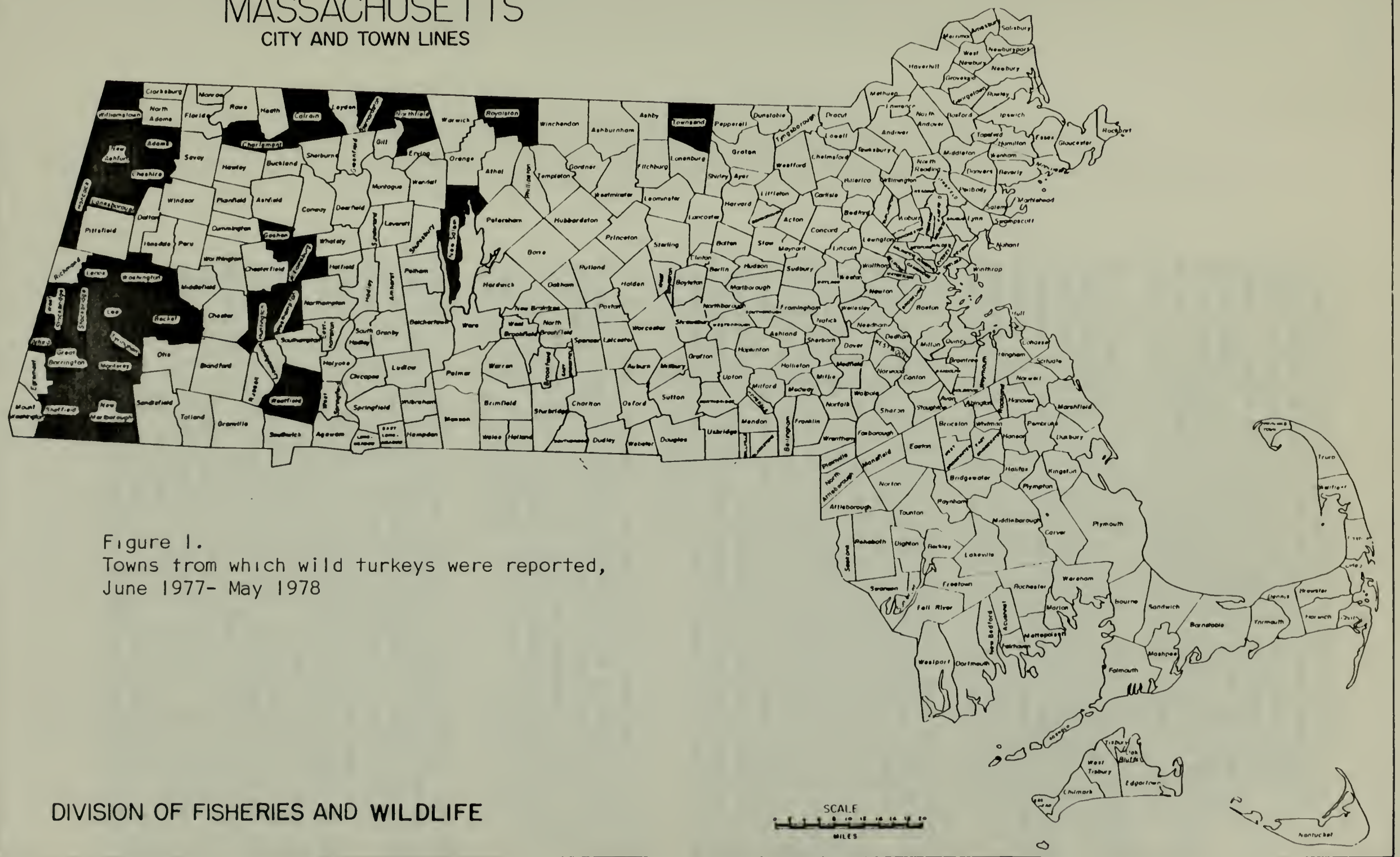

Figure 1.
Towns from which wild turkeys were reported,
June 1977- May 1978

DIVISION OF FISHERIES AND WILDLIFE

An unstated number of turkeys were seen by cooperators during deer week 1977 near Breakneck Road in Tyringham, and tracks of two birds were found in late March on the slope southwest of Hayes Swamp. One tom was killed by an automobile in February on Main road in Tyringham and the remains of another tom (killed by car? killed by dog?) were found in brush just off George Cannon Road.

To the south of Beartown, five turkeys were reported near Three-Mile Pond in Sheffield in September 1977 and six near Brewer Hill Road in New Marlboro in December. Twenty birds were reported near New Marlboro Road in that town twice between deer week 1977 and January 1978, and a single bird was seen near Thousand Acre Swamp, New Marlboro, in December 1977.

Reports to the east of the Beartown area have been few, perhaps reflecting higher elevations and more stringent winter conditions. Single birds were seen in Becket (September 1977) and twice in Washington (July-August 1977). A single bird reported several times in Westfield in 1977-78 may represent an escaped or illegally released bird (see W-35-R-19 performance report). Reports of single birds or small groups in Huntington, Goshen, Westhampton, and Williamsburg are well outside the known current occupied range and the presence of turkeys in these towns, and their source, needs to be ascertained.

To the west, reliable reports were received of 17-27 turkeys seen in Alford between late November and early December 1977, and of 21 turkeys observed on Harvey Mountain in West Stockbridge in November 1977. One or two birds were also seen at several locations in Lee, Lenox, Stockbridge, Lanesboro, Cheshire and Hancock during 1977-78.

Turkeys continue to be reported from northern Berkshire and Franklin counties, probably resulting from an influx of birds from Vermont releases. Seven birds were seen on the slopes of Mt. Greylock in New Ashford in April 1978, and four to eight birds were seen at different locations in Williamstown four times between September 1977 and April 1978. Twenty birds were reported near Burlingame Road in Adams in January 1978, though field checks by Division personnel later that month failed to verify it. Seven turkeys were reported by a cooperator in Bernardston in October 1977 and six in Charlemont in April 1978. In Colrain, 10-12 birds were reported off Rt. 112 in fall 1977, three in late November, and 14-17 in February 1978. Single birds or tracks were also reported from Northfield in early 1978.

A few reports further east may derive from range expansion from releases in New Hampshire. A single tom was seen feeding in a manured field in Royalston, Worcester County, in May 1978 and a single hen was flushed from a roadside in Townsend, Middlesex County, in September 1977.

Turkeys continue to persist on Prescott Peninsula in the Quabbin Reservation, with most of the sightings concentrated on the lower half of the peninsula. Reports from Division personnel and cooperators indicate that broods were produced. Division personnel observed 23 turkeys between Mt. Pleasant and Prescott Brook road in October 1977. This was probably a majority of the population in that area.

Cooperators reported gobbling near Wachusett. Meadows in Princeton in August 1977. There were no other reports from the Barre area, nor from Douglas State Forest.

Additional Activities: The project leader gave one slide talk on the turkey project.

Acknowledgements: I extend my appreciation to personnel of the Division of Forests and Parks, Division of Law Enforcement, Metropolitan District Commission, and the University of Massachusetts for their cooperation and assistance.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by: _____
James E. Cardoza
Game Biologist

Date: _____

PERFORMANCE REPORT

State: Massachusetts Project No.: W-35-R-20

Project Title: Game Population Trend and Harvest Survey

Project Type: Research and Surveys

Period Covered: 1 June 1977 to 31 May 1978

Work Plan VI: Black Bear Study

Work Plan Objectives: To determine the range of the black bear in Massachusetts and to define its population characteristics and rate of harvest by hunting.

Job VI-1: Black Bear Population Dynamics

Job Objective: To determine the range of the black bear in Massachusetts and to define its population characteristics and rate of harvest by hunting.

Summary: Applications for bear hunting permits were received from 441 sportsmen. No bear were taken during the open season. One road kill was reported. New reports of 33 observations totalling 50 bear were received from 18 towns.

Target Date: 31 May 1979

Progress: On Schedule

Deviations: None

Recommentations:

1. Continue evaluation of the bear harvest through checking stations.

2. Surveys have been useful in the past as a means of broadly determining occupied range, and, to a lesser degree, population trends. Additional techniques should now be employed, however, to more closely monitor bear numbers. One potentially useful index involves the use of scent station routes.

3. Continue collecting and aging teeth from harvested and road-killed bear. If possible, also obtain female reproductive tracts.

4. Investigate nuisance complaints as necessary.

Cost: $924.65 (Project Leader man-days: 13)

Publication approved by Alfred C . Holland, State Purchasing Agent #5146

Remarks:

Procedures: Current bear hunting regulations include the mandatory reporting and tagging of harvested bears. Bear checking stations were maintained daily during deer week at three locations: Birch Hill Wildlife Management Area, Baldwinville; Bitzer State Fish Hatchery, Montague; and Western Wildlife District Headquarters, Pittsfield. Station personnel were requested to affix a metal game seal to legally harvested bear, to remove a premolar tooth, and to record the following information: town of kill, date killed, sex and weight of bear, and method of kill.

The Information and Education Section issued periodic news releases asking for reports of bear. Cooperating agencies and individuals also reported sightings.

Findings: Bear hunting permit applications were received from 441 individuals during the 1977 hunting season (Table 1). No legal or illegal kills were recorded. This lack of success was attributed to lessened effort on the part of experienced hunters and to probable early denning by the bears. Reports from other New England states indicate that bears did den early in those areas.

One male bear, weighing 73.5 kg. (162 lbs.) was killed by an automobile on 31 October 1977 on Route 2 in Charlemont, Franklin County.

Thirty-three (33) new reports totalling 50 bears were received during this segment. These included 29 sightings, three reports of track or sign and one road kill. Observations were made in 18 towns and five counties. The increase in reports over 1976-77 can be partly attributed to additional effort on the part of cooperators. The report from Douglas, Worcester County, is the most southeasterly report received since collation of sightings was begun in 1970. Reports by county for the period 1952 to May 1978 are presented in Table 2.

Family groups were reported in July and August 1977 from three locations, including a sow and three cubs in Florida, and a sow and two cubs in both Savoy and Hawley. Groups of bears not specifically described as families were reported from Peru and Williamsburg.

Three nuisance bear complaints were received, including one each concerning beehives, standing corn, and goats. All reports were from Franklin County. The goat predation was not verified.

The 1977 road kill was donated as a specimen to the Museum at Northeastern University.

Table 1. Number of Bear Permit Applications and Number of Bear Taken in Massachusetts from 1970 to 1977.

Year	No. Permits	No. Bear Taken	Other Mortalities
1970	214	-	1 illegal kill; 1 road kill
1971	200	-	-
1972	423	1	1 illegal kill
1973	309	-	1 road kill; 1 captured bear
1974	390	2	1 road kill
1975	483	3	2 illegal kills; 3 captured bear
1976	430	3	1 illegal kill; 1 road kill
1977	441	-	1 road kill

Table 2. Reports of Black Bear by County for Massachusetts, 1952 to May 1978

County	1952 - May 1976	1976-77	June 1977 - May 1978	Total	Percent
Berkshire	162	3	22	187	37.5
Franklin	167	4	6	177	35.5
Hampden	24	1	1	26	5.2
Hampshire	78	4	3	85	17.0
Middlesex	11	0	0	1	0.2
Worcester	22	0	1	23	4.6
	454	12	33	499	100.0

Additional Activities: The project leader attended the Fourth Eastern Black Bear Workshop in Greenville, Maine, and served as a committee member for working papers on "Factors Important for Determining Bear Season" and "Census Techniques and Population Indices". Two radio and one television interview on bears in Massachusetts were presented. A fact sheet on bear was prepared for the State Legislature in connection with a bill proposing a closed season on bears in the Commonwealth. This bill was reported out of committee unfavorably; however, a resolution was passed authorizing the Division to conduct further studies on bear.

Acknowledgements: I appreciate the assistance of the Division of Law Enforcement in reporting sightings. Mr. Charles Quinlan of Williamstown also deserves credit for his interest and detailed reports.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
Bureau of Wildlife Research and Management

Approved: _____
Richard Cronin, Superintendent

Prepared by _____
James E. Cardoza
Game Biologist

Date _____

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